The Mining Journal

Established 1835 — Railway & Commercial Gazette

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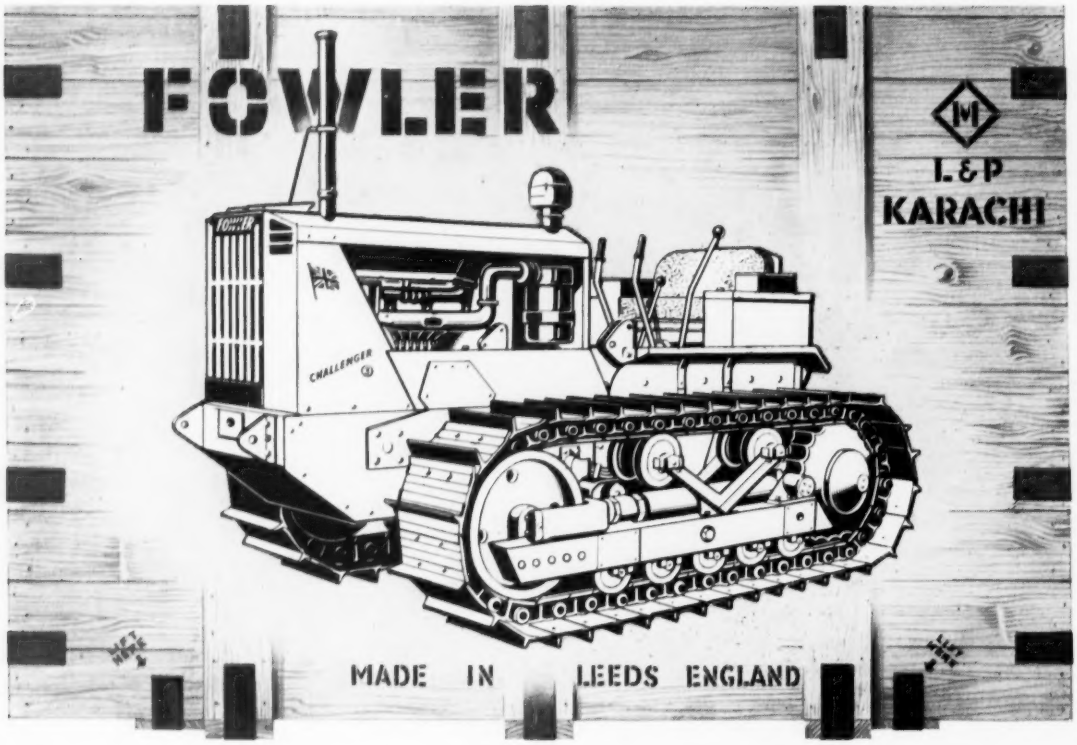

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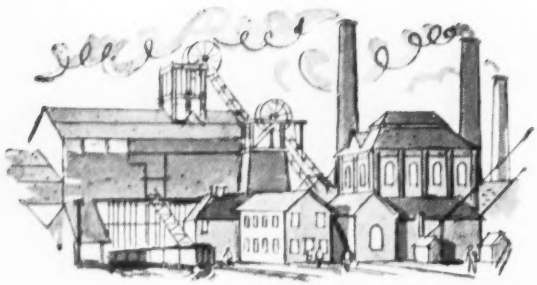

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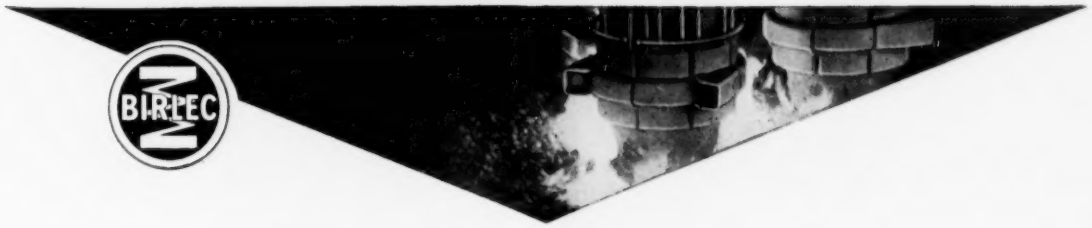

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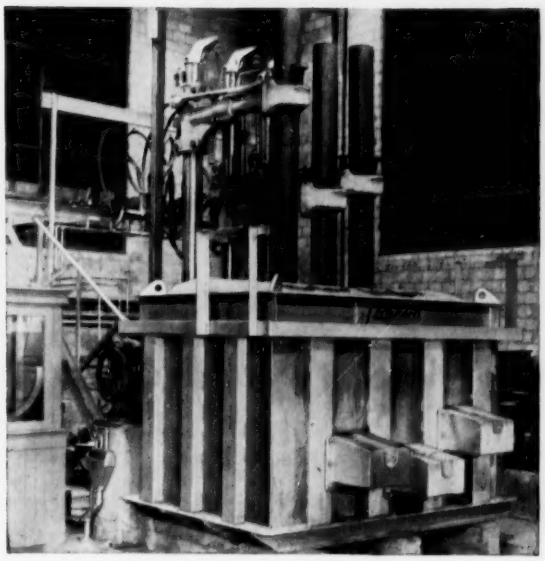

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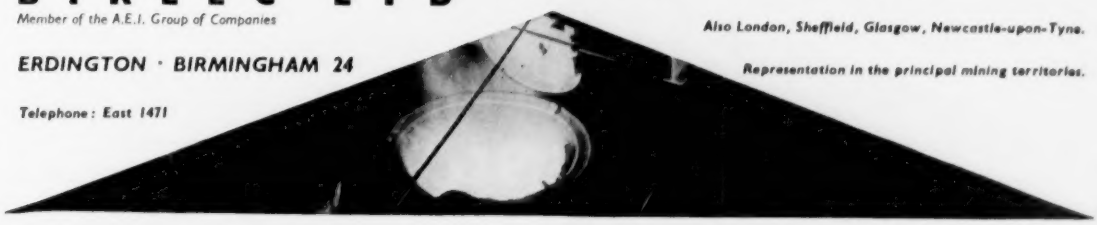

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The Mining Journal

Established 1835

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NOTES AND COMMENTS

Industrial Relations on Trial

We can, and will, stay out for three months, the Associated Society of Locomotive Engineers and Firemen is reported to have claimed. If by that is meant that the A.S.L.E.F. can afford to pay strike money to its entire membership for three months that will come as a surprise to many; if, on the other hand, it implies that the nation will tolerate a three-month railway strike then it is the railwaymen who are going to be surprised. Let the makeshift methods be as efficient as they may, it is inconceivable that unemployment will not have become widespread by the end of next week. Nothing could better illustrate the extent to which the A.S.L.E.F. has lost touch with reality than its calm assumption that steel workers, car workers, builders, engineers and so on are going to live on the dole for three months while it pursues one of the most futile strikes in many years.

There are, of course, special features which inevitably make any strike distinctive. In this instance there is the peculiar and long standing, and perhaps inevitable, quarrel of a skilled union with a would-be industrial union. Another peculiarity is the obtuseness of the British Transport Commission in its conduct of wage negotiations over the past two years. As soon as the B.T.C. committed the fatal error of allowing the National Union of Railwaymen to negotiate "at the summit" with the B.T.C., while allowing the A.S.L.E.F. to take its claim through the normal machinery up to the Railway Staff National Tribunal, the probability of divergent awards was present. It is one of the ironies of the situation that although, through ineptitude, the B.T.C. is as much responsible as any of the unions for the present tragedy, and although the N.U.R. has been much more bellicose and intransigent than the A.S.L.E.F. yet it is the A.S.L.E.F. that has been edged into the strike and has reaped the annoyance of the public and the fellow unions.

But if there are always special features, there are also certain forces which seem always to be at work in the fomenting of recent strikes—even if the trouble making of Communists and others is disregarded.

First, there is the vexed problem of differentials. Partly the anxiety over differentials reflects the anxiety of all those who have seen their status submerged by the general rise in personal incomes; the skilled engineer protesting in the industrial sphere about his differential is making the same complaint as the father of a large family or the old age pensioner make to their M.P.s about the cost of living. They are all the "hard cases" that the welfare state has brought in its wake. But the problem is made more difficult by the refusal of unions to examine differentials objectively and to regard as in some way sacrosanct the differentials that existed—by chance—in the year A.D. 1939. It is also worsened by the refusal of unions to negotiate on earnings as against base rates, for it is actual earnings—the take-home pay—which reveal the inadequacies of differentials.

Secondly, there is the weakness of the T.U.C. structure. Shaken to the core in 1950 by the rejection of its wages policy by Congress the General Council has since emphasized its advisory character and contented itself with giving platitudinous bulletins on economic affairs to which unions could give assent while remaining free to pursue entirely contradictory policies. The General Council has recently emerged from its shell and has played a useful part in helping to settle recent disputes. It ought bravely to toss its shell away and take a much more aggressive line on disputes arising from inter-union quarrels. Since the present railway strike will not be settled till Mr. Baty and Mr. Campbell can agree the General Council should have cracked their skulls together long before the strike became effective. In other words, inter-union disputes which undermine the economy are more truly the T.U.C.'s responsibility than whether Mr. Bevan is a member of the Labour Party or whether this or that delegation ought to go to Russia or not.

Thirdly, there is the weakness of the lower ranks of union officials. Union executives are not out of touch with their members, for they, like managing directors, can take occasional strolls "through the works." The unions suffer, as do most firms, from bad communications and they do so because their lower officials are worse paid and less adequately trained even than industry's foremen. It is the council level at which contact is maintained with union rank and file that the good intentions of the responsible union secretaries generally go astray. Industry is doing something about its problems of communications; the unions are

simply denying it exists because to admit that there is a gap between rank and file and executive is to admit not only to inefficiency but—what is worse in their eyes—to undemocratic procedure.

It is these weaknesses in trade union structure that the new Government ought sympathetically, but firmly, try to remove. There is no need for the law to be altered. Making strikes illegal has been shown to be ineffective; making unofficial strikes illegal would place an intolerable power in the hands of union executives for they would have the power to decide whether a strike should be official and hence legal. But there can be no doubt that improving industrial relations is the principle responsibility of the Government.

The Government is well placed for its task. It has a comfortable—but not tyrannical—majority; it has won the election without making promises that it must now redeem (such as the Excess Profits Tax of 1951); and it has only a short session to face before Parliament breaks up for the summer so that there is no case for a heavy legislative programme. Moreover, it can reasonably expect the Labour Party's co-operation. It is not clear what the electorate voted for—except the absence of change—for the Conservative programme was virtually non-existent; but it is clear what the electorate voted against and that was the specifically itemized Labour programme. If the Labour Party is wise it will not veer sharply to the left but will pick up some of the Conservative clothes just as the Conservatives wisely accepted the welfare state in 1951. It is in the sphere of labour relations that the Labour Party can make—if it will—a distinctive and useful contribution that would regain for it the confidence of the electorate.

The strikes will pose other problems for the new Government. They will postpone the recovery of the economy (a £300,000,000 surplus on oversea account is already a hopeless quest for 1955) and, by reason of the threat to the balance of payments prolong the necessity for Bank rate at 4½ per cent. German competition is already too fierce for some British industries and strikes in essential services may well be fatal. If ever there were a time when sensible administration, rather than vast legislative programmes, is called for this is it and the Conservative claim to provide it is going to be tested as it was never tested in the last three and a half years. With the parties no longer in even balance, the Whips may be less powerful, freedom from party doctrine may be given greater reign, constant attendance at the House in case of snap votes will not be necessary, pairing will be less difficult; conditions will be, what they have not recently been, conducive to clear thought and M.P.s will be able to speak to each other rather than to their constituents in parliamentary debate. There is, in fact, a great opportunity for Parliament to function as the Council of the nation ; let us hope that all parties recognize the fact.

Russian Aid for Indian Diamond Mining

The Mujgawon diamond deposits of the Panna district, Vindhya Pradesh, India, were only systematically examined as recently as 1953, the task being undertaken by geologists of the Indian Bureau of Mines and the United States Bureau of Mines, who considered that the profitable production quota of the Mujgawon field might be considerably increased.

These developments were held up to a marked degree by a lack of diamond drills, and in September of last year our Indian correspondent pointed out that efforts to secure diamond drill units from overseas sources had met with little success. The statement produced a welcome and immediate reaction from British manufacturers of diamond drilling equipment who, in our issue of September 17, 1954, were reported to have pointed out to *The Mining Journal* that there were no difficulties standing in the way of India obtaining diamond drills from this country. United Kingdom manufacturers were able and willing to supply diamond drilling equipment to India and, in fact, were reported at that time as doing so.

In his latest despatch, however, our Indian correspondent has pointed out that the Panna Diamond Mining Syndicate has asked for Russian technical help for the development of diamond mining. Disclosing this in the Rajya Sabha, New Delhi, Mr. K. D. Malaviya, Minister for Natural Resources and Scientific Research, Government of India, said that the Syndicate's development scheme was progressing.

In the event of development according to expectations, they would have about 2,000 ct. of diamonds per day. Rs.7,240 had been spent, said the Minister, on travelling allowances and contingent expenditure of the officers of the Indian Bureau of Mines who visited the diamond bearing areas in Vindhya Pradesh and South India in connection with the study of the disposition of diamond formations for planning detailed prospecting.

Meanwhile, the Government of India has set up an eight-member committee to investigate into the working of the diamond mining industry in Vindhya Pradesh and to submit recommendations for its improvement not later than June 1, this year.

The committee has been set up following representations made to Mr. Malaviya when he went to inaugurate a 500-ton plant in one of the diamond mines in Panna.

Dr. Pichamuthu, former Director of the Geological Survey of Mysore State, has been appointed chairman of the committee which comprises two representatives each from the State Government and raising contractors and one of the three principal diamond lessees. Dr. Madan of the Council of Scientific and Industrial Research, and Dr. Deshpande of the Indian Bureau of Mines are also members of the committee.

The terms of reference of the committee are to make a detailed investigation into all aspects of the diamond mining industry in the State, with particular reference to the system of raising contractors, the existing arrangements for the sale of diamonds by auction at Panna, the feasibility of introducing a co-operative form of organization for shallow mining, and the improvement of security arrangements so that there is no leakage of revenue that accrues to the State from this industry.

Factors Effecting the Price of U.K. Steel

British steel prices have recently come under review. During last month the heavy steel workers have been conceded an extra 10s. per week, and the blast furnacemens claim for higher pay for week and overtime has also been settled. But the forthcoming advance of 7½ per cent in railway freight rates constitutes a much more serious charge upon the makers of iron and steel, and it may be recalled that earlier increases in railway rates in 1953 and again in 1954 were followed by the upward revision of the controlled prices of iron and steel. The new Minister of Supply may have been too pre-occupied with the General Election campaign and the Socialist threat of re-nationalization of the industry to give to this matter the close attention it deserves, but as the new rates come into operation on June 5, there is not much time to lose.

Meanwhile, one minor price change has already been made, the controlled price of cast iron scrap having been advanced 10s. per ton with the designed purpose of encouraging the movement of this material between areas of surplus and areas of shortage.

Perhaps the most significant feature of this price variation is that it was agreed after consultations with the British Iron and Steel Federation, the joint Iron Council, and the

National Federation of scrap Iron Steel and Metal merchants. It is not unreasonable to hope that there will be similar consultations before any general change in iron and steel prices is ordained.

Anglo American Corporation's Report

The Annual Report of the Anglo American Corporation of South Africa published to-day dealing with the Group's activities in 1954 is a document worth studying by shareholders, mining companies, the merely inquisitive, and by all those interested in furthering the idea that shareholders should be told as much about their company as possible.

The layout is good, the data is presented in an easily assimilable form and the several illustrations—some multi-coloured, some half-tone, together with appropriate maps evokes interest throughout its 82 pages.

Having said that, the more is the pity perhaps that Anglo American Corporation has not seen fit to follow—even at a considerable distance—the trend apparent in the United States where the reports of an increasing number of companies are becoming a valuable guide as to how expectations in the current year can be reconciled with performance figures.

The mining finance houses of South Africa publish monthly and quarterly statements concerning the mines under their administration so that broadly speaking the year's results can be roughly assessed before the appearance of the Annual Report. There is, admittedly, some up-to-date comment on the activities of the various mines in the Anglo American Group but the information has already been published. Thus the real value of this brave attempt in presentation is nullified to a very large extent by the fact that it is still an " historical " document and does not provide the shareholder with any clear idea as to how his mine or his company or, indeed, the Group as a whole will fare in the months ahead.

The Rhodesias

(From Our Own Correspondent)

Salisbury, May 25.

There are signs of a reawakening of interest in the smaller copper deposits of the Federation of Central Africa. Copper mining has hitherto been undertaken almost exclusively by two large groups, Rhodesian Selection Trust and Anglo American, but Mr. W. A. E. Winterton, chairman of Magundi Copper Mines and Minerals Ltd. a former Southern Rhodesian Cabinet Minister and now a member of the Federal Parliament, has outlined to a meeting of shareholders here a plan to mine copper in Northern Rhodesia on a smaller scale.

An investigation on behalf of the Magundi Company has revealed the existence of deposits which can be exploited by a company of " more limited resources," Mr. Winterton told shareholders. He then announced that the Company had secured certain interests over copper-bearing properties in Northern Rhodesia. The total found ore deposits in these properties to date amount to 158,000 tons of four per cent copper, worth about £4,000,000.

Vigorous attempts are also being made to exploit Southern Rhodesia's limited copper resources. Hitherto, they have usually ended in failure but the Prime Minister of the Colony, Mr. R. S. Garfield Todd, stated recently that it looked as if the country would have two copper mines in the future, though these would be " small by Northern Rhodesian standards." He said also that another copper proposition is being investigated, and various coal, iron and nickel occurrences are being actively prospected.

Sir George Usher, chairman of International Combustion and Aberdare Cables, aroused interest in Salisbury recently by suggesting that some of the Federation's copper should be sold internally at well below world market prices. He said failure to do this was costing the Central African Federation thousands of pounds.

Aluminium, for which there were many uses in industry, was having to be imported into Central Africa because of the present high price of copper. This, he said, seemed to be " a strange procedure " for one of the largest copper producing countries in the world.

Sir George said, something should be done to see that the copper requirements of the Federation were satisfied at a price that does not provide an advertisement for aluminium.

CHROME MARKET LOOKING UP

Railings of chrome from Southern Rhodesia improved considerably earlier this year but lately the position has deteriorated. Railings in February, March and April were the highest during the past year but during May the number of trucks being made available to the chrome industry has dropped. Chrome producers are dependent at present upon the Salisbury-Beira railway line for 95 per cent of their railings. They are hoping, however, that the new railway line to Lourenco Marques, which was completed in May, a year ahead of schedule, will bring them relief.

Mr. G. H. Parkinson, general manager of Rhodesia Chrome Mines Ltd., Selukwe, said recently that the market in chrome was " tending to improve "—an opinion echoed by Southern Rhodesia's Minister of Mines, Lands and Surveys, Mr. G. A. Davenport, who told the 16th annual meeting of the Chamber of Mines of Rhodesia that the chrome market was " again looking up."

Mr. Davenport also announced at the meeting that chrome producers who have been exempted from royalty since last July, are likely to have it re-imposed shortly. He added that he knew the retention of mining royalties was a " sore point " but the Government could not afford to sacrifice them at present.

One reason he gave for the retention of royalties was to encourage the use of minerals by local industry and to encourage producers themselves to take part in local manufacture.

KARIBA POWER IN 1960

M. Andre Coyne, the French hydro-electric power expert, has forecast in a letter to the Federal Prime Minister, Lord Malvern, that if " certain conditions are satisfied " the first power will be supplied by the Kariba hydro-electric scheme in 1960. The French hydro-electric consultants who were called in last year by the Federal Government to evaluate the Kariba and Kafue hydro-electric projects estimated at that time that the first power from Kariba could not be made available until July, 1961.

M. Coyne visited the Federation in March and April this year to give the Federal Government a final appraisal of the Kariba scheme. He stated in his letter to Lord Malvern that the Kariba scheme now appears, technically speaking, to be operable under the most favourable auspices—even more so, M. Coyne said, than he anticipated before his visit to the Federation.

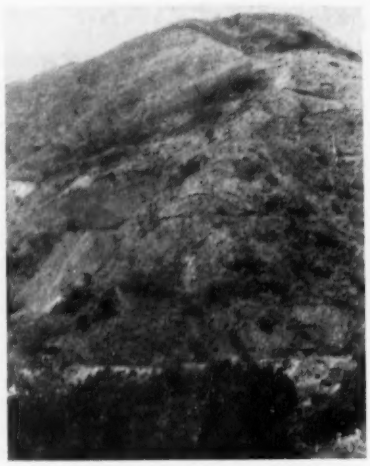
The World Bank has not yet announced its opinion on Kariba. Notwithstanding this, work of a preparatory nature has already begun at the dam site. It is believed here that tentative orders have ben placed by Rhodesia Railways for material to extend the railway line from Sinoia, the present railhead, towards the Zambesi River to serve the Kariba site area.

Mining Developments in East Africa

(From Our Own Correspondent)

Construction work on the plant at the Kilembe Mine in Uganda is well under way. The mine is situated at 4,500 ft. elevation in the base of Ruwenzori Mountains. The crushing plant will have a capacity of 2,300 tons a day, but the present intention is to mill 40,000 tons a month.

A bulk concentrate will be made by flotation, and after grinding to 55 per cent minus 200 mesh, copper and cobalt concentrates will be made by differential flotation. These concentrates will be piped several miles to a roast-leaching plant situated at Kasese on a slope adjoining the Lake George flats.



The Eastern Deposit outcrop, Kilembe, down the centre spur

The concentrates will be roasted in a fluo-solids reactor, and then leached. The cobalt oxide produced will be railed and shipped direct to market, and the copper concentrates will be railed to Jinja, near the Owen Falls Dam, where they will be smelted electrically. The new railway from Kampala to Kasese is already in operation for more than half its length and is expected to be ready for freight to Kasese by the end of this year.

Power for the mine, orginally planned to be brought from Jinja by a £2,000,000 line, will now be generated locally by harnessing the Mubuku River, which flows down from the peaks of Ruwenzori. No storage reservoir is necessary. From a submerged intake in a concrete weir the water will be led round the contour in a semi-circular steel flume for a distance of 12,000 ft. This gives a head of 600 ft. and will provide some 6,000 h.p.

Kilembe Mines Ltd. is a company formed by Frobishers Ltd., the Colonial Development Corporation, and the Uganda Development Corporation. The last two corporations are subscribing £2,500,000, and the remainder of the capital, which may amount to £6,500,000 in all, is being found by Frobishers. The ore reserves amount to nearly 15,000,000 tons running 1.92 p.c. Cu and 0.18 p.c. cobalt.

Unlike the Tanganyika wolfram mines which were compelled to close down temporarily during the slump in price early in 1954, the Uganda mines were able to carry on owing to their contracts with the Ministry of Materials. Under these contracts the Ministry has agreed to purchase their outputs at a minimum price of 250s. per unit until the latter part of 1957. The five-year term of security which they thus received enabled the owners of these mines, which are all virtually privately owned, to go ahead with the installation of plant to increase their outputs.

With the exception of the Bahati Mine, which is a high-grade reef proposition owned by Kirwa Wolfram Mines Ltd., all the wolfram mines operating in East Africa are on deposits consisting of a multitude of small lenticular veins and stringers running in a graphitic phyllite.

The deposits are usually mined by quarrying the whole, picking out the quartz and wolfram-bearing material in the faces by hand, and sending the rest to waste. This waste often contains several pounds of wolfram to the ton, not all of which is recoverable. On the two largest mines, therefore, plants are projected to treat the whole of the material.

The deposits are usually wide, well over 100 ft., and so can be quarried to a considerable depth. When it is necessary to go underground, as at the Luhizha Mine in Uganda or at K.C. Mines' properties in Tanganyika, selective mining on the more persistent veins is practised.

At the Nyamulilo Mine of Bjordal Mines Ltd., a plant with a capacity of perhaps 300 tons a day has been completed, and trial runs are now being made. A normal gravity-concentration flowsheet is used. At Kirwa Mine (Kirwa Wolfram Mines Ltd.) a similar plant is projected and much of the machinery has been delivered. Construction is about to commence. Both these mines have inferred reserves of well over 1,000,000 tons.

The Anglo American Corporation are taking considerable interest in these wolfram deposits and have recently sampled the Kirwa Mine and several others. The immediate future of wolfram in East Africa may not appear at first sight to be particularly rosy, owing to the enormous reserves and good grade of the many mines in Korea. Nevertheless, supplies to the West are very largely dependent on Korea and are liable to be cut off. The obtaining and preparation of deposits in a securer part of the world seems, therefore, a good instance for the continuity of supplies.

Diverting Mubuku River for Kilembe Mine power scheme

The main workings of Kirwa wolfram mine

GOSLAR ORE DRESSING CONGRESS—II

Papers Presented at the International Ore Dressing Congress, 1955

The International Ore Dressing Congress held at Goslar, Hartz district, Western Germany, between May 8 and 11, 1955, has been the subject of articles appearing in *The Mining Journal* of May 20 and 27, when a preview of the whole Congress was given by our representative at the Congress, followed by summaries of those papers of specific interest discussed during the first and second days. The following article concludes the summaries of the papers presented on the second day of the Congress, together with those discussed on the third day. Reference is also made to the papers not discussed at the Congress.

During the second day of the International Ore Dressing Congress, 1955, held at Goslar, many interesting papers were presented and discussed. Three of these papers were noted in the last issue of *The Mining Journal*, and the remaining two papers of specific interest discussed on that day appear in précis herewith.

OTHER PAPERS PRESENTED ON THE SECOND DAY OF THE ORE DRESSING CONGRESS

Manufacture and Properties of Ferrosilicon for Heavy-Media Separation, by F. Rodis: The author describes how the ferro-silicon is usually made and how the lumps are broken and ground either wet or dry to the desired size.

A new method has been evolved which dispenses with grinding, the liquid melt being atomised by air or steam, quenched in water dried and screened. The powder resulting from this method of manufacture has very different properties from the ground variety as the particles are mainly spherical in shape having smooth and reflecting surfaces of extreme hardness. On the other hand, ground material possesses sharp edges and ridges and the surface is more or less rough.

Due to the difference in shape, the atomized material is less liable to corrosion whilst there is no chance of contamination by material worn off the grinding mills which may become attached to the ferro-silicon and promote corrosion. Due to the spherical shape the consistency of the medium is lower and a density of 3.7 can be obtained with a viscosity (or more accurately consistency) of 12 centipoises whilst it is only possible to attain a density of 3.3 with a ground material having the same consistency.

In practice a density of only 3.1 to 3.2 can be attained with a ground ferrosilicon but with the atomised material a working density of 3.45 can be used. It is also claimed that owing to the shape the loss of medium is lower. The material used is not larger than 0.20 mm. and contains not less than 60 per cent—60 microns with some material as fine as 5 microns.

In the discussion the fact that some atomised ferrosilicon was porous and therefore affected the density and viscosity was made but the author pointed out that this was mainly seen on grains over 0.15 mm. in size. The pores, however, were largely at the surface so that they did not affect the density and there was only about 2 per cent of closed pores in the coarser sizes. Methods of determining the consistency were also discussed.

Sizing and Sorting in Centrifugal Separators, by H. Trawinski: The author describes various types of hydrocyclone and centrifugal separators. The centrifuges have not been used for ore separation in a strict sense owing to the high wear with hard ores, but are used in the treatment of clay and coal fines. The hydrocyclone, however, has become established in the field of mineral dressing because it has no rotating parts. Large particles can be treated in low pressure cyclones but are less efficient, but it may be possible to increase the separation size to about 300 microns by using a cyclone in a horizontal position. As far as the finer limit is concerned it is around 10 microns using cyclones of 10 to 20 mm. diameter.

Apart from the normal equal settling effect, the hydrocyclones achieve a further sorting by the strong shearing effect within the turbulent flow and its tendency to destroy agglomeration. For this reason this type of classification is superior to static current classifiers whilst the static vessels are better for thickening.

At this session the following papers were also discussed: *Studies of the Magnetic Separation of Minerals*, by R. Tille and W. Kirkpatrick, and *Pulp Handling in Ore Dressing Plant*, by G. Salzmann.

PAPERS PRESENTED ON THE THIRD DAY OF THE ORE DRESSING CONGRESS

Milling Sulphide Ores at the Boliden Mining Co., by P. H. Son Fahlström: Since 1947 a very large sum has been spent on extensions to the Boliden Mines and Smelter, over one-third being spent on the dressing plant and the mine output will be increased from 1,000,000 to 1,600,000 tonnes per year. The author described the plant and extensions in which he said that in order to obtain optimum yield and purity, xanthates are employed with deep cells in the flotation plant. The Boliden cell differs from other types in that the pulp and air bubbles pass through the cell in counter-flow, the air being introduced into the cell from outside blowers. The xanthates are added along the whole circuit so that there is always a slight deficiency in order to yield a high grade concentrate.

The copper is floated with potassium amyl/xanthate in an alkaline pulp. From copper-lead-zinc ores, a mixed lead-copper concentrate is removed from a slightly alkaline pulp which is later separated using dichromate, sphalenite is floated with ethyl/xanthate in the presence of lime and copper sulphate.

The Separation of Bleiberg Ores, by W. Enyfelder: This paper describes the dressing operations of Bleiberg-Kreuth in Carinthia, where lead-zinc ores are treated in a central plant. The flowsheet has been modified from time to time and finally a combined gravity/flotation treatment adopted. After 1945, a study was made with a view to further modernization but no alterations were considered desirable. The author described the plant as well as the types of ore treated and stated that better results have been obtained by treating various ores separately rather than a regular proportion of all types.

Jigging precedes flotation after sizing into four products and about 37½ per cent is discarded as tailing whilst 3.5 per cent is recovered as a lead concentrate. The remaining 59 per cent is ground for flotation. In view of the high proportion of jig tailing, the possibility of dense media separation was investigated and tests showed that 50 per cent of the feed could be discharged as a tailing without greater loss than was incurred in the jigs. All material treated by flotation is ground to approximately 100 mesh.

Finally, the pilot plant for wulfenite recovery was described, largely treating old dump material and employing a sulphidizing and flotation procedure.

In the discussion, the factors brought out that tables had been used in an earlier plant but were eliminated when the jigging process followed by flotation was introduced. Some questions were also asked on the subject of the wulfenite plant and speakers compared the results of the sulphide plant with these obtained in other plants in Europe.

Ore Sampling, by P. Gy : In this contribution the author dealt with the required weight of an ore sample for assuring a certain degree of accuracy and with sampling diagrams for use in order to facilitate quick solution of sampling problems.

The author has certainly contributed a great deal to the literature on the question of accuracy in sampling and proposes a formula giving the error as a variable depending on the coarsest particle size, on the weight of the initial lot, and the weight of the sample. Other facts such as the particle shape, size distribution, degree of intergrowth and mineralogical composition were also taken into account but by studying extreme cases, it was concluded that some parameters do not vary a great deal and a simplified formula evolved. Examples for various types of ores were given in the text and graphs for the rapid solution of the formula under varying conditions were explained by the author whilst introducing the paper. Copies of these graphs with explanatory text in French were handed to Congress members.

The Application of a Factor Analysis Plan in Research Work at the Touissit Flotation Plant in French Morocco, by G. Bogard : This paper explained how the principle of factor-analysis was applied to improve the depression of sphalerite in the lead circuit. Before entering into a detailed description of the investigation, the author gave a short survey of the calculation necessary to compile a table of variances and then continued to show how the principle was applied, the conclusions drawn, and ended with a justification of the simplified factor-analysis plan and general remarks on its merits and limitations.

The author pointed out that for its best application, the work should not be entrusted to a mathematician but to a plant engineer with experience of mineral dressing who should possess considerable knowledge of statistics.

Dressing of Special Materials other than Natural Ores, by H. Rush Spedden : In this paper which was read by Dr. Spedden, there being no pre-prints available, the author dealt with the special application of mineral dressing techniques in connection with metallurgical processes. For example slags could be crushed and ground and treated by conventional methods such as gravity, magnetic separation or flotation. Other cases could be cited where the material was given a pyrometallurgical treatment in order to alter constituents which could be subsequently separated by utilizing dressing techniques.

In the case of titanium chemical processing was expensive, aluminium was undesirable but it could be forced into a slag and removed. Selective reduction was also possible whereby some of the iron present in the ilmenite could be reduced. If the resulting material was finely ground and treated by magnetic separation, the resulting material was much higher in titanium. It had been shown that at 1,100 deg. C. with carbon, most of the iron was reduced without affecting the titanium appreciably.

Similarly in the case of chromite some of the iron could be reduced and it had been shown that there was solid diffusion of the reduced iron to the outside of a particle where it collected as globules. After grinding this could be removed by suitable magnetic separation. The action was only partial but nevertheless it caused appreciable enrichment of the chromite. Other cases of the special application of mineral dressing techniques were also given by the author.

The Use of Mineralogical Techniques for Improvement and Supervision of Dressing Operations, by E. Cohen : This paper by one of the staff of the Royal School of Mines was introduced by Mr. E. J. Pryor who amplified one or two points and stressed the importance of proper identification of mineral species in this work.

In the paper the writer pointed out there is a tendency to use mineralogical and metallographic techniques without adaption to the special requirements of mineral dressing whilst the mineral dresser tends to rely exclusively on chemical assays and to make insufficient use of the help which the mineralogist can provide.

Examples of the value of mineralogical examination were given and the scope of the services required by the mineral dresser classified into three groups :

(a) The study of ores prior to any treatment.
(b) Assistance in the development of new dressing methods and improvement of existing processes.
(c) Help in the daily routine control of mill operation.

A survey of the methods and techniques which were used at the Royal School of Mines was given including the use of stereoscopic and polarizing microscopes, chromographic contact printing, thin section radiography, X-ray powder photography and the use of the ultra-violet lamp. The proper preparation of samples was also discussed and the problems of rapid assaying methods mentioned.

In the discussion the importance of developing special techniques of mineral examination in connection with mineral dressing was stressed again and one speaker said that at the Camborne School of Mines very similar views had been held for some years, and indeed a subject dealing specifically with the examination of mill feeds and products had been incorporated in the normal curriculum of that college. Methods employed had been discussed by Dr. Hosking (1952).

There they had specialized on identification of components of samples of loose grains containing superficially similar minerals and the result of the work was on the point of being published. It should considerably increase the number of tests of the type which had already been given prominence by Gaudin and Raffinot. The limitations of electrographic contact printing were pointed out and the importance of developing more speedy if not highly accurate methods of quantitative analysis for mill control stressed.

Microscopic Examination in Mineral Separation by G. Rewald : The author pointed out that the particle size at which values are to be separated is of decisive importance in the selection of the separating process and proceeded to deal with various means of examination available, for determining constituents, assessing intergrowth and the liberation size, and examination of flotation products.

He pointed out that the erroneous opinion was sometimes expressed that breakage occurred along grain boundaries—this was exceptional. It was therefore necessary to determine the liberation in comminuted material. This was best done on size fractions, particularly as this also prevented segregation when mixed sizes were being sampled. Screens could be used down to 200 mesh but beyond this size sedimentation had to be used although it was not usually necessary to split the sample into fraction beyond nine microns. When mineral grains have to be not only liberated but also ground finer, then surfaces and internal structures may be related. In such cases polished sections may be more helpful than grain samples.

PAPERS NOT DISCUSSED AT THE ORE DRESSING CONGRESS

Among the papers not discussed at the Congress were the following :

A Contribution to Cassiterite Concentration, by Professor Grunder : In this paper Dr. Grunder surveys various attempts to float cassiterite, describing the work in connection with Altenburg ore and gives the results of some basic investigations which finally led to the construction of the first plant. In spite of a great deal of work, this did not prove satisfactory. Later a new way was worked out by Neunhoeffser and Grunder to float the cassiterite with special reagents. Tests have proved quite successful and it would appear that the problem may be considered solved.

In the original test work it was shown that oleic acid was a good collector as was castor oil acid, but linoleic palmitic and stearic were unsuitable. Both oleic and the castor oil acid gave good results with ammonia. Sulphonated and sulphated fatty acids also gave good results in general and complete sulphonation was not necessary. Soaps were tested but proved poor as although recovery was good, enrichment was poor.

Other derivitives of the fatty acids were tested and oxidation products, and amino-salts gave good recovery. The use of formic acid gave a good concentrate and 85 per cent recovery whilst acetic acid and ammonian nitrate produced a good yield. In general, the pH of flotation was found to be best below 6.0, flotation being effected with reagent N.G.P. Sulphuric acid, amyyxanthate coal-tar oil and Flotol.

The second part of the paper deals with a new development in gravity treatment of fine sizes using a form of centrifugal concentrator termed basket-separation. The machine is described briefly and results of test work given. It is emphasized that the development of this process has been interrupted and that it is not yet ready for plant operation. Nevertheless, it is to be hoped that the invention can be brought to a successful conclusion as the results quoted are certainly interesting and the principle appears sound.

It is necessary to use a number of concentration-stages but even so, with the saving in space compared with the conventional flowing film concentrators of the round frame and " dead " frame types, it is most certainly worth further consideration.

Principles and Applicability of the Rheaux Washing Processes in Ore Dressing, by F. Kirnbauex : This paper describes the Rheaux vertical washer for sand washing or grading into sizes. It consists of a vertical classifying chamber into which the feed is introduced below the top and above the constriction area. Additional water is introduced tangentially in the lower part of the chamber where it is enlarged and is said to be widely used for sand sizing on building sites, when it provides precise grading, low wear and operation costs, high through-put and quick adjustment.

The vertical type is best suited for material for 0.5 to 2 mm. in size, whilst a compound arrangement involving repetition treatment with horizontal units is said to be effective at cuts between 0.4 and 0.015 mm. It is suggested that similar arrangements could be used for preparing table and for desliming flotation feeds.

Other papers not discussed at the meeting included : *Factors in Assessment of the Properties of Heavy Media*, by F. W. Mayer ; *The Double Movement Jaw Crusher*, by H. Ruhl ; *The Stripa-Process for Sink-and-Float Separation*, by J. Svensson ; *The Classification Effect in the Rosin-Rammler-Bennett Plot*, by H. Trawinski.

Lead and Zinc Production in Finland

After lead, zinc has become the second most important non-ferrous metal product in Finland. The following article, condensed from *Mineral Trade Notes*, Vol. 39, No. 5, published by the U.S. Bureau of Mines, describes lead and zinc production in Finland.

With the completion of the first full year of operations of the Metsamonttu mine in 1953, zinc has become the second most important non-ferrous metal in Finland. Output from the mine during the year was 73,308 tons, and the concentration of this ore and that of the Aijala and Orijärvi mines resulted in an output of 6,579 tons of zinc concentrate. The potential zinc concentrate output is about twice this quantity, but the increasing demand for sulphur has forced the Outokumpu company to refrain from producing zinc concentrate in favour of pyrites both at the Outokumpu and Aijala mines. The annual recovery of zinc concentrates is not considered large enough to warrant establishing a domestic zinc refinery.

Concentrates are now exported under an agreement between Outokumpu Oy. and a Belgian company whereby a part of the recoverable metallic zinc is returned to Finland. In 1953 Belgium supplied Finland with 2,509 tons, or 61 per cent of its total zinc imports of 4,096 tons.

THE LAMPINSAARI ORES

Outokumpu Oy. reports that developed ore at the Lampinsaari zinc mine to a depth of 250 metres is now estimated at 6,000,000 tons, with an average zinc content of 12.5 per cent; copper, 0.85 per cent; and lead, 0.5 per cent. About 1,000,000 tons of pyrite and magnetite ores can be extracted from the deposit. Annual output is expected to be 400,000 tons of ore, instead of the 300,000 previously reported. The annual output of concentrates is estimated at 64,000 tons, 10 times the present domestic output ; 7,500 tons of copper concentrates ; 1,800 tons of lead concentrates, and 50,000 tons of sulphur pyrites.

Work on the installations required to open the mine has had priority among all the projects of Outokumpu, and most of this work has been done on the two mining towers (one of which is 87 metres high and said to be the second highest in the world). The installations for crushing and storing the ore ; the concentration plant, the repair shop ; and the power and heating stations have been begun, machinery and equipment is being installed. Two vertical shafts are almost completed, but much of the underground work is yet to be done. A railway line leading to the mine has been laid and most of the housing for the mine's staff has been built. About 400 persons are expected to be employed when full-scale operations begin.

LARGE OREBODY INDICATED

The Institute of Geological Research reports that the loose boulders containing galena found at Korsnas originate in an orebody under the surface of fairly shallow water. According to the Institute, it is too early to make any definite statements on the potential profitability of the deposit, but that samples received through drillings from the submerged deposit are derived from an orebody of substantial size.

Iron and Steel Research

The interests of the British Iron and Steel Research Association extend from consideration of ores *in situ*, through the fabrication processes, to some uses of the finished product, finally including the design and operation of plant and equipment. Much work of importance to the mining industry is reviewed in the Association's annual report for 1954, the more interesting facets of which are presented in the following article.

As the Conakry ore deposits have been developed, the Ironmaking Division has become increasingly concerned with the use of material from the lowest bed, Bed C. The two main problems are the very high moisture content (35 to 40 per cent), which is extremely difficult to remove and makes the material expensive to transport, and the fineness of the ore, which necessitates agglomeration. The methods of preparation under investigation include sintering, agglomeration in a heated rotary kiln, briquetting, and vacuum extrusion.

WIDE RANGE OF EXPERIMENTS

As a result of experiments on a small laboratory-scale Smidth kiln, part of a cargo of Conakry Bed C ore has been made available for trials on the full-scale plant at Cardiff. In a preliminary run to determine the behaviour of the material, 10 per cent of the normal kiln feed was replaced by a similar quantity of Bed C ore. No difficulty was experienced, and the dust content of the chimney gases was similar to that obtained with a normal burden. Subsequently 100 per cent Bed C ore with 15 per cent coke was fed to the kiln. Preliminary results indicate that the method is suitable for agglomerating this material, the high moisture content of the raw material (30 per cent) being acceptable.

Sintering tests have been carried out using ore from Conakry Bed C. Because of the fineness of the ore preprocessing was necessary, and it was found that in spite of the high moisture content the shaker board produced a material suitable for sintering.

In view of the high moisture content, there would be real advantages in dehydrating and agglomerating this ore at the mines to avoid transport costs for carrying water. Sintering, however, would require coke breeze, which is not available at Conakry. Indeed, any fuel, required would have to be imported, and the relative merits of processes using oil must therefore be considered. The Smidth kiln uses gas as well as coke and might therefore be more suitable at Conakry.

Further investigations have been carried out on the beneficiation of Oxfordshire ironstone. Separation by heavy liquids of specific gravities from 2.69 to 2.88 was unsatisfactory because the ore could not be enriched without considerable loss of iron. However, magnetic roasting and concentration removed much less iron and more lime, but neither method appreciably diminished the silica and alumina content. The latter process would involve magnetic roasting, grinding, concentration, and final agglomeration; it would recover 90 per cent of the iron and remove 30 per cent of the lime, but is not likely to be acceptable to the industry because silica or alumina are not decreased.

It is estimated that more than 12,000,000 tons of iron and manganese ore were imported into the United Kingdom during 1954. This material was unloaded from ships and, together with large quantities of home ores, was handled again at stockyards by mechanical grabs. Although mechanical grabs have been used for many years, a recent survey has shown that greater efficiency might be obtained by better design. Investigations into the mechanical properties of granular materials, together with theoretical studies of grab action and studies with model grabs, were begun about a year ago, and are being contined in co-operation with grab manufacturers.

Experiments are being carried out with model grabs to determine the influence of the various characteristics of a grab on its efficiency. The model grabs used have been specially designed to allow the following features to be varied : (1) Height, span, width and proportions of the grab ; (2) Purchase, defined as the ratio of the horizontal component of the force at the jaw to the force in the closing ropes ; (3) Weight and weight distribution ; (4) Jaw shape and type of jaw edge.

The discharge of ore from new ore carriers has been observed, wherever possible, to study desirable features.

Much of the ore imported has still to be brought in general cargo ships, and to remove the last 20 per cent of the ore (trimming) requires considerable time and labour. Existing machines for mechanizing trimming are being studied. A new design employing a back-hoe which scrapes ore on to a conveyor belt carried by a straddle carrier has been patented, but its development is being deferred in view of the apparent success of a new design of overhead bucket loader which has recently become available. The slushing technique employed abroad will shortly be tested at an ore port. With this method, large cable-drawn blades are used to move the ore to the centre of the hold, but appropriate fittings have to be installed in the ship.

A study of wagon design has shown that the preference for four-axle bogie wagons for mineral traffic abroad, rather than the two-axle wagons employed in Britain, is justified by the larger loading gauge permitted ; under these conditions four-axle wagons result in a shorter train. For the loading gauge and axle load permitted on British Railways, four-axle wagons give longer and heavier trains than two-axle wagons for a given load when used for carrying coal or other light material, although there are fewer units to handle. For general purposes two-axle wagons are recommended, with as great an axle load as the railways will permit. The use of four-axle wagons is justified when, and only when, it can be restricted to imported ore ; i.e., when the wagons can be run on a shuttle service between particular docks and works.

Stress measurements made on a loaded wagon (tare 23 tons) showed that when the load was increased from 47 tons to 64 tons of ore, the increase in stress did not exceed ¼ ton/sq. in. in any place; the maximum stress recorded was under five tons/sq. in. The body of the wagon was found to give some support to the frame. As a result of these measurements, the railway authorities agreed to the increased load, subject to minor modifications to the wagon.

GENERAL ACTIVITIES

A Publicity Panel has been formed by B.I.S.R.A. to study and advise on ways of obtaining wider application of methods of combating corrosion. A booklet entitled "The Prevention of Corrosion" has been published. It sets out what is known about the various choices that face engineers concerned with anti-corrosion measures in air, soil and water, so that the lessons of experience and research may be readily available. In appropriate circumstances enquiries from non-members for advice on corrosion problems will be accepted on a fee-paying basis.

B.I.S.R.A.'s links with steel producers in the Commonwealth, which began some three years ago with the election to membership of a South African company, have been extended to India, Canada and Australia.

Developments in the U.K. Coal Mining Industry

The following article continues our practice of presenting the developments taking place within the coal mining industry of the United Kingdom. It is of particular interest to note that the majority of these developments are the result of the experience of underground personnel.

A creeper which can deliver full coal tubs on to a weighbridge and then carry them away to the tippler has been designed in the No. 1 Area, South Western Division. Although the creeper and chain are of conventional pattern, the attachment links are so designed that they will make contact with the tub axles only when a central roller, which forms part of the link, is supported by a channel on the creeper path. The channel, which is of 6 in. x 3 in. section, ends at the point where the track runs on to the weighbridge and so lowers the attachment links below the level of the axle, leaving the tub standing on the weighbridge.

The tub will remain standing on the weighbridge until a second tub pushes it on to the end section of the creeper, where a further length of channel raises the attachment links which carry the tub away to the tippler. Speed of tub delivery on to the weighbridge is determined by the number of attachment links fitted to the creeper chain. No attendants are required to operate the device.

SHAFT GATE INTERLOCK

A shaft gate interlocking device, designed in the Lothians Area, Scottish Division of the N.C.B., will prevent a colliery winding engine starting up while men are entering or leaving the cage. The interlocking action is produced by a locking box fitted to the driver's brake lever. This is so arranged that when the brake lever solenoid incorporated in the box is de-energized, a pawl and ratchet devise is engaged with the brake lever in such a way that the lever is locked when moved by the on position.

Gate switches are provided at each point where men enter or leave the cages and arranged to be in the closed position only when the gates they control are closed. Lock-out switches at loading and unloading levels provide protection for the banksman and onsetters during coal winding. Audible and visible warnings are provided in the engine house and at all landings and are energized when it is unsafe for anyone to enter or leave a cage. There are also visible indicators in the engine house.

The sequence of operation starts with the driver moving the automatic contrivance—slow banker—lever into the "men" position. If all the landing gates are closed a supply is fed from the transformer through a selector switch operated by the slow banker lever to a bank of men-winding relays, each of which is controlled by the gate switches at the appropriate level. Each relay has three sets of contacts—two normally closed and one open—which control the indicator lamps and the gate contactors. With all gate switches closed, the men-winding relays are energized and contacts in series with the coil of the gate contactor are closed and consequently the brake-release solenoid is energized. As soon as any gate is opened the appropriate men-winding relay opens and the amber light comes on.

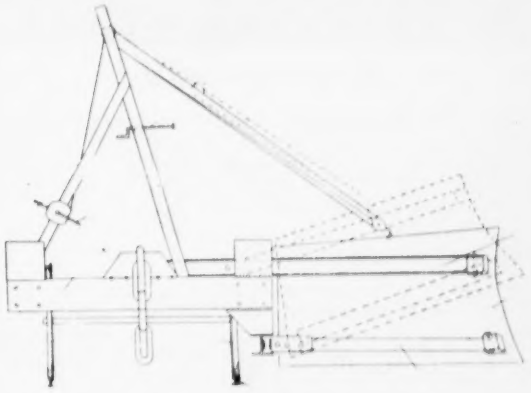
The appropriate series contact de-energizes the gate contactor which, in turn, de-energizes the brake-release solenoid. If the winder brake is not fully applied the alarm system is energized by the normally closed contacts of the gate contactor and the brake interlock switch which is in the closed position. In this way the banksman and onsetters are warned that it is unsafe for anyone to enter or leave the cage and the driver is warned that his brakes are not fully engaged.

A similar bank of coal winding relays is selected when the slow banker level is in the "coal" position. These relays are controlled by lock-out switches at each level instead of by gate switches. By this arrangement the men-winding gates can be left open during coal winding but the onsetter or banksman can lock the winder out before entering the cage for any reason.

A TIPPLER PLOUGH

Accumulated spillage left after the tippling of wagons at colliery spoil heaps frequently requires a considerable number of men to remove it. A labour-saving plough to do the job quickly has been invented at Hawkins Colliery, Cannock Chase.

The plough is attached to a chassis which runs on the railway track, and has a plough blade extending to one side of the track. This blade can be raised and lowered



The Tippler Plough

and extends at an angle of 20 deg. to 40 deg. to the side of the vehicle; support arms raise and lower it, and these are operated by a winch mounted on a tripod, over the apex of which passes the winch rope.

REVERSIBLE ENDLESS HAULAGE

Recently a reversible endless haulage was introduced at Dalkeith Colliery, Midlothian, for conveying men from the surface for a distance of 1,000 yards. The gradient at the top of the mine was 1 in 2.6, levelling out to 1 in 14 with undulations. Trouble was experienced with the indicator system which was taken from the shaft of a Clifton wheel by gearing and chain drive to the indicator dial. This trouble was due to the difference in rope tensions.

On checking, it was found that the variation could amount to approximately two-thirds more of a turn of the Clifton wheel to bring the rope back to the same mark at the top. Various suggestions were made to overcome this difficulty and a ring with a recessed side was bolted to the face of the dial and a second ring was made to fit and just revolve on the smaller diameter of the recessed ring. The length of the journey is marked on the loose ring and the top mark has a projection to engage the pointer of the dial. When the man-riding set comes near the top, the pointer engages the projection and carries it slightly forward until the set is stopped at the top, thus the bottom mark is immediately set for the downward journey.

MACHINERY AND EQUIPMENT

An Interesting Display

On Thursday, May 26, a representative of *The Mining Journal* was amongst the large gathering attending the press day organized by Mackay Industrial Equipment Ltd. After a tour of the works—considered by the company to be excellently equipped for the overhaul and repair of earth-moving equipment—the gathering witnessed a demonstration of the Allis-Chalmers HD21, the biggest and most powerful crawler tractor in production in the world.

The Allis-Chalmers HD 21

The HD21 was described in full in our issue of March 4, 1955. The unit is fitted with a 4-stroke, 6 cylinder Allis-Chalmers diesel engine which produces a gross h.p. of 235 and a net engine h.p. of 204. This gives a drawbar pull of 65,000 lb. assuming zero track slippage.

Plastics in the Mines

Plastics in all its applications are to be seen at the Third British Plastics Exhibition, which opened informally at Olympia, London, on June 1 until June 11. The exhibition and convention are organized by the journal, *British Plastics*, with the co-operation of the British Plastics Federation.

The extent to which plastics are invading even our coalfields is well illustrated in the British Geon display at the exhibition. Three life-size miners are shown working a 4 feet 6 in. seam and loading coal on to a non-flammable PVC coal conveyor belt. This display underlines one of the major PVC developments of recent years in which British Geon has played a leading part. To-day, many thousands of tons of PVC—itself derived from coal—are required to satisfy the National Coal Board demand for non-flammable conveyor belting.

The "mine" is ventilated with a 12 in. diameter PVC coated ventilation tube which is rot-proof, corrosion-resistant and fire-resistant. Nearby is PVC coated brattice cloth—the Geon PVC confers low flammability. PVC insulated and sheathed mining cables are prominently displayed as well as irrigation envelopes for the treatment of wounds, made with PVC sheeting. N.C.B. protective clothing in PVC coated fabric is also shown.

Typical mining uses of other plastics materials are also illustrated. These include rings for miner's cap lamps in Styron polystyrene; junction box fuse holders and other electrical accessories in Rockite phenolic material; and a gear wheel in a fabric laminate employing Cellobond laminating resin.

Colliery Plant for India

The shipment to India during May of two 175 h.p., electrically-operated, single drum haulages from the Chesterfield works of Sheepbridge Equipment Ltd., a subsidiary of Sheepbridge Engineering Ltd., will mark the completion of a recent contract for the supply of colliery equipment to the Digwadi and Sijua collieries of the Tata Iron and Steel Company of India.

The contract, valued in excess of £40,000, concerns a total of five haulages, each over 18 ft. long, 12 ft. wide and 10 ft. high and each weighing 33 tons. The haulage drums are 8 ft. in diameter and 5 ft. 6 in. wide, giving a 1 in. rope capacity of 1,200 ft. The rope speed is 8 m.p.h. and the electrical gear operates on 3,000 volts, 50 cycles A.C., 3 phase.

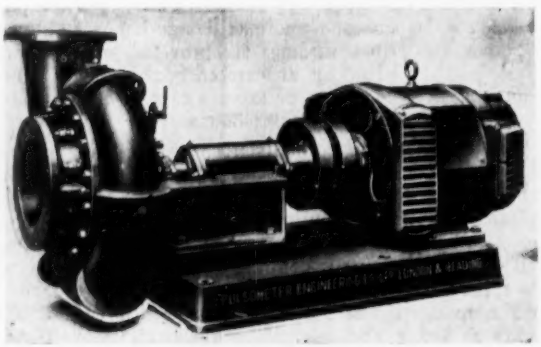
The most up-to-date safety features have been incorporated.

Centrifugal Pump for Viscous Materials

The slurry pump manufactured by the Pulsometer Engineering Company Ltd., now embodies many interesting features, one of which is a pump spindle mounted on generously rated double ball and roller bearings representing a still further improvement on the original designs. Another important feature is that the inevitable wear of impeller and sideplates can be adjusted without dismantling the pump, an arrangement which greatly reduces the time wasted in erecting repairs. These pumps are supplied in 2 in. - 14 in. standard sizes and cover a range of duty from 50-5,000 gallons per minute for heads up to about 60 feet.

The pump casing is very close-grained cast iron steel etc., of extra thickness and in the large 12 in. and 14 in. sizes there is a renewable cut water which is in harder material than the casing, having covers so arranged that it can be examined and renewed without opening up the pump.

The single inlet type impeller is open on the side facing of the suction and shrouded on the other, whilst radial vanes are provided at the back to balance partially the hydraulic end thrust. The stuffing box is packed with ordinary soft packing and if clean water is available the best arrangement is to have a water seal for which a screwed boss is provided, assuming of course the clean water is at a pressure exceeding the static head on the suction side. The usual drive is by means of a direct coupled electric motor mounted on the same bedplate as the pump and having a spindle fitted with a flexible coupling forming a neat and efficient arrangement.



The Pulsometer Slurry Pump

For particularly severe conditions where there is danger of corrosion in addition to abrasion, stainless steel is used for the construction especially when salt water is present whilst for acid water, austenitic iron or non-ferrous alloys are employed. The pumps are effective for water containing abrasive solids such as sand, pyrites and coal ash.

The Millionth Fan

At Woods of Colchester Ltd., on April 26, staff and visitors watched the assembly and testing of the millionth fan in the firm's machine-number record. The final nut was formally tightened by Mr. A. E. Watson, a director of J. T. Meredith and Co. Ltd., Consulting Engineers, who ordered the fan, a 48 in. dia. two-stage Aerofoil unit with contra-rotating impellers.

METALS, MINERALS AND ALLOYS

COPPER.—The copper supply in the United States continues to be as tight as ever and no appreciable easement is expected before the autumn. The shortage of nearby physical copper is particularly acute and buyers in urgent need have been paying as much as 42 c. per lb. to dealers. It is expected that copper deliveries during May would approach the figure of 130,000 tons, in other words not far short of the peak level of March. It is understood that only negligible amounts of material are available for delivery in June and that producers are already opening their books for delivery in July. *Reuter* reports that a large producer has sold 17,500 tons of copper for delivery over the next 18 months to a large public utility on a regular contract basis. The price basis is to be arranged at the time of shipment. Meanwhile, although the export restrictions on copper scrap have prevented the supply of scrap from deteriorating further, it has still been necessary to raise prices to bring out any sizeable amount. Scrap copper has been changing hands at about 33.50 c. per lb.

It is exceedingly difficult to forecast the likely turn of events in the American copper industry. Free market supplies have recently tended to firm in price to much the same extent as in London, and while the American economy is operating at such a high level it is clearly going to be difficult for supply to catch up with demand. The complicating factors are the possibility of a strike in the motor car industry (which directly and indirectly is an important user of copper); the possibility of labour trouble in the American copper mining industry itself as wage negotiations get under way; and the uncertainty created by the approach of the vacation period. One thing seems clear, and that is that the motor industry cannot continue throughout the year to produce cars at its present rate; that rate is something in excess of 8,000,000 a year although the industry itself does not expect to sell more than about 6,500,000 in 1955. Since about 100 lb. of copper goes into every motor car this will account for an appreciable easing of pressure. But it is still not possible to foresee the date on which the American producers' price of about 36 c. will actually represent the American copper price, still less the date on which the American producers themselves abandon the 36 c. level.

Meanwhile, the difficulties in England arising from the supply of copper from R.S.T. at a fixed price and the supply of a much greater amount on L.M.E. price basis do not appear to be easing. It is worth pointing out that the R.S.T. scheme took effect on May 9 and that the price was guaranteed for 30 days so that next week R.S.T. will be free to change their price if they wish to or even to abandon the scheme. There is, of course, no compelling reason for R.S.T. to throw in their hand since their argument in favour of price stability must seem as cogent now as when it was introduced. However, the scheme has created immense pricing difficulties for those fabricators who buy a part of their supply from R.S.T. mines. Perhaps more important it has not had the effect either of bringing the L.M.E. price down or even of stabilizing it. The only difference now is that whereas prices were once unstable they are now unstable and incalculable.

What may prove to be an alternative solution to the difficult copper supply-demand situation in Britain lies in an announcement that a new company has been formed within the S.G. Warburg group with the object of assisting consumers of copper to finance stocks. It is not yet known how the scheme will work but when once world supply and demand regain their balance it could have an important part to play.

From Chile it is announced that the remaining ministers of the Chilean Cabinet have followed the example of their colleagues and tendered resignations to President Ibanez. There is no reason to suppose that there is any immediate threat to the mining industry in this announcement but it emphasizes once again the extremely slender hold that the government maintains over the country and its economy.

The Chilean Government has denied reports that it is about to change the present foreign exchange system and provide for freely fluctuating exchange rates; the reports themselves, however, have emanated from a government source.

Sales of copper by American-owned plants in Chile have reached 330,000 tonnes so far this year according to the Minister of Mines. He estimated total copper production for 1954 at 430,000 tons.

Output of electrolytic copper in April in Japan was down to 9,884 tonnes compared with 10,335 tons in March.

According to Mr. J. C. Ferguson of the Geological Survey of Southern Rhodesia, production will start at the Umkondo Copper Mine in the Sabi Valley at the end of the year. Reference to Umkondo's coming into production is made under "Mining Markets".

LEAD.—There has been moderate to good activity in New York on the basis of 15 c. per lb., but there is no indication of the strength of demand that would carry the price any further. Stocks of refined lead at the end of April dropped to 54,956 tons against 59,881 tons a month earlier. The stocks were the lowest since February, 1953. Production of refined metal was virtually unchanged. Consumption of lead during March rose 16 per cent to 98,090 tons and all the main usages took part in the increase.

The Senate has passed, and sent to the President the Bill extending to June 30, 1956, suspension of all import duties on metal scrap except lead and zinc scrap.

Legislation has been introduced by Senator Goldwater of Arizona which would direct the government to purchase 200,000 tons of lead and 300,000 tons of zinc for the stockpile at a combined cost of 31 c. per lb. It will be recalled that the domestic mining industry has been calling for a minimum combined price of up to 32 c. per lb.; at present it stands at 27 c. per lb. No date has been fixed for discussing the measure and it is unlikely to get very far. It would inevitably increase the flow of imports and equally inevitably would entail their control.

TIN.—Tin has continued during the past week in New York to be a featureless and quiet market as it has been now throughout 1955. Now that the Texas smelter is to keep going for another year, and now that the vacation period is in sight, it is hard to see the price moving much further at all, and surely not upward. At the end of the month the New York spot price declined to 91.62 c. per lb. from 91.75 c. earlier in the week.

Meanwhile, there is threat of a strike at the Texas tin smelter where 300 C.I.O. workers are demanding a 10 c. an hour increase. The union has been authorized by the members to call a strike if a satisfactory settlement is not arranged. Since the output of the smelter is taken by the stockpile, the strike cannot have any commercial consequences, unless it were extremely prolonged and orders for concentrates had to be cancelled. However, the Texas smelter is, of course, prodigiously inefficient by commercial standards and there is, perhaps, nothing like putting up wage costs and making it still more inefficient for bringing Congress to a sensible conclusion about its future.

Mr. D. T. Waring speaking at the annual meeting of the Federated Malay Straits Chamber of Mines has made a strong plea for the revision of taxation of the Malayan tin industry. He said that the Malayan export duty was the highest levelled by any tin-producing country and that it represented 16 per cent of the value of tin concentrates, without allowance for deduction for working costs. Taking together the export duty on tin ore and income tax, Malayan taxation, he said, amounted to 49 per cent of gross profits earned, before deduction of taxes. Finally, he complained of the many delays in securing a revision of rates and of the fact that the government was now awaiting a report from the International Bank, although the Bank's mission left Malaya about a year ago.

Dr. R. H. Lueck, vice-president of American Can Company and in charge of its research and technical department, has spoken again of the development of the tin-less can. Primarily, work is going on at the company's laboratories on producing a can of coated steel in which the coat might be aluminium, nickel-plate or enamel. It is also possible that plastic cans may have an important future. It is always interesting to read these forecasts which come regularly from the American Can Co. that the tin can is on its way out. It is, however, difficult to reconcile the spending of millions of dollars on developing a tinless can with the spending of millions more on stockpiling tin. It is a pity that the laboratory is not situated in Texas.

ZINC.—During the past week good business has been passing in Prime Western zinc on the basis of 12 c. per lb. East St. Louis. The demand for the special high grade continues in excess of supply, primarily for the motor car industry. In some quarters it is felt that if there is no strike in the motor industry the pace of this demand would raise the price basis to 12½ c. If this is so, then the price increase must come fairly soon, because, with the motor industry producing about a third more cars than it can possibly expect to sell, there must inevitably be a falling off in production in the third and fourth quarters. Moreover, it is only during the last few weeks that the demand for prime Western has recovered its strength following its last increase.

The Blackwell smelter of the American Metal Company in Oklahoma is understood to have escaped serious damage from the tornado which swept over the area last week.

ALUMINIUM.—With the U.S. Government due shortly to review the possibility of reviving the third round expansion programme for domestic aluminium production, particular interest attaches to last week's announcement made by the St. Joseph Lead Company in conjunction with the Pittsburg Consolidation Coal Company that the two Corporations were considering the erection of a 66,000 ton aluminium plant (costing $85,000,000) to be powered by coal.

The proposal is understood to be in an entirely embryonic stage and the purpose of the announcement is no doubt to test out Washington reaction in this eventuality to a request for special Federal tax relief in the form of accelerated amortization write-offs. We gather it is not envisaged that St. Jo. would go into the bauxite mine business. From what we hear the proposal is that the new plant would purchase bauxite or alumina from one of the established producers—very possibly Kaiser Aluminium in view of the rumour that the fabricating end of this latter group is likely to provide the principal market for the new plant.

A notable aspect of this scheme (which, if realized, would provide the States with a fifth domestic producer of primary metal) is that by using coal the country's strained hydro-electric capacity would not be further taxed. Until recently such a scheme would scarcely have appeared economic owing to the high cost of power generation from coal. As, however, the American coal industry is still suffering from a severe depression it may well be that Pittsburg Consolidation are finding it worthwhile to supply coal at extremely favourable prices in order to sustain the volume of output.

If the American coal industry is to remain permanently depressed in the face of competition from oil, we may hear of further schemes of this kind—always assuming that the third round expansion programme does get started. Even now, however, it is difficult to see the economic justification for the further stimulation of relatively high cost American production in view of the rapidly expanding Canadian production from Kitimat, as well as other newer schemes which are under consideration. Certainly the States have every reason to be grateful for the very high priority which Aluminium Ltd. have always given to the American market's requirements and it is significant that whereas in 1949 Alcan's shipments to the States were around 72,000 s.tons, last year they were 205,000 s.tons and this year are expected to exceed 240,000 s.tons. So far, of course, Kitimat's contribution to this total has been relatively small and the full impact of this vast project has yet to be felt.

It was announced last week that the Anaconda Aluminium Company expects to have the first pot-line at its new Montana plant operating next month with a second line coming into operation in August. The present production target is 20,000 tons a year with an eventual output expected to reach 60,000 tons. Anaconda's entry into aluminium production makes this company the fourth domestic aluminium producer. Despite various abortive attempts by Washington to get other independent producers into the business Alcan, Reynolds and Kaiser at present hold the field.

TITANIUM.—The U.S. Bureau of Mines reports that they have entered into a co-operative agreement with the Wah Chang Corporation to conduct research and development work on an improved process for producing titanium sponge metal. The work will be done at the Bureau's experimental station at Boulder City and will involve the temporary re-activation of their titanium pilot plant. Wah Chang, which has already developed the process in question on a small scale in its own laboratories will bear the major part of the cost of this project and will provide the technical know-how.

The Bureau will make available to industry the results of the test and particulars of any improved processes which may result.

SILVER.—Since our reference under "Notes and Comments" last week to the strengthening silver market, the New York price has advanced to 90.50 c. per oz. by 0.09 c. above the then price of 90.41 c. which represents parity with the U.S. Treasury's fixed purchase price for newly mined domestic silver. This further fractional increase presumably covers the extra transportation charges needed to divert domestic silver (refined mainly in the East near the U.S. Mint) to industrial use in other parts of the country. It appears to be the impression of some silver trade circles that the price may go higher still—perhaps by another ¼ c. It is, however, difficult to visualize a large increase above the U.S. Treasury's fixed buying price, as once this level is reached the whole of the U.S. domestic production is potentially available to the industrial buyer. Moreover, although the U.S. Treasury is not legally bound to do so it has the power to sell silver as well as to buy and it will be interesting to see whether the Treasury enters the market as a seller if the price goes ahead any further.

The London Metal Market

(From Our Metal Exchange Correspondent)

Markets have been extremely quiet during the past week, which include the Whitsun holiday, with little of interest to disturb the present price structure. The question as to the future course of the railway and dock strikes is of particular concern to all branches of the trade, and the trend of markets must to some extent be dependent on this.

The dual price situation in copper is still the cause of a certain amount of confusion. June 9 marks the end of the first thirty-day period, and it may be wondered whether the Rhodesian Selection Trust will take any action with regard to its fixed price, for the gap between this and the L.M.E. quotation has widened to an extent which could hardly have been anticipated at the beginning of the period.

The tin market in London has remained steady in spite of a £4 decline in Singapore over the week-end. On Thursday morning the Eastern price was equivalent to £732¼ per ton c.i.f. Europe.

Lead and zinc quotations have shown little change, although demand for current month metal at the end of the last settlement period caused a slight widening in the backwardation.

Closing prices and turnovers for four days are given in the following table :—

	May 26		June 2	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£330	£331	£342½	£345
Three months	£317	£317½	£328½	£329½
Settlement	£331		£345	
Week's turnover	5,175 tons		1,820 tons	
Tin				
Cash	£715½	£716	£717	£718
Three months	£717½	£718	£717½	£718
Settlement	£716		£718	
Week's turnover	495 tons		470 tons	
Lead				
Current half month	£103½	£103½	£103	£103½
Three months	£102½	£103	£102½	£103
Week's turnover	2,475 tons		1,925 tons	
Zinc				
Current half month	£90½	£91	£91½	£94½
Three months	£88½	£89½	£89½	£89½
Week's turnover	4,250 tons		1,700 tons	

OTHER LONDON PRICES — JUNE 2

METALS

Aluminium, 99.5%, £163 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60% basis) 22s./24s. nom. per unit, c.i.f.
Bismuth
(min. 2 cwt. lots) 16s. lb.
Cadmium (Empire) nominal
Chromium, 6s. 5d./7s. lb.
Cobalt, 21s. lb.
Gold, 250s. 10d.
Iridium, £30 oz. nom.
Manganese Metal (96%-98%) £255/£265 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade £519 per ton
Osmium, £30 oz. nom.
Osmiridium, £40 oz. nom.
Palladium, £6 12s. 6d./£7 5s. oz.
Platinum, £27 10s./£29
Rhodium, £40
Ruthenium, £16 oz.
Quicksilver, £108 ex-warehouse
Selenium, 43s. nom. per lb.
Silver, 78½d. f.oz. spot and 78¾d. f'd
Tellurium, 15s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 60% 8s. 3d. lb. c.i.f.
20% 3s. 3d. lb. c.i.f.

Chrome Ore—
Rhodesian Metallurgical (semi-friable) 48% £13 per ton c.i.f.
" Refractory 45% .. £13 per ton c.i.f.
" Smalls 42% .. £10 2s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26-£27 d/d
Magnesite, Raw .. .. £10-£11 d/d
Molybdenite (85% basis) .. 105s. 3d.-108s. 1d. per unit c.i.f.
Wolfram and Scheelite (65%) .. 250s./257s. 6d. c.i.f.
Tungsten Metal Powder (98% Min. W.) .. 20s. 0d. nom. per lb. (home)
Ferro-tungsten (80%-85%) .. 17s. 0d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £37 6s. 3d. d/d per ton
Ferro-manganese, home .. £53 17s. 6d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. 80d./81d. per unit
Manganese Ore (38%-40%) .. 67d./69d. per unit
Brass Wire .. .. 3s. 1½d. per lb. basis
Brass Tubes, solid drawn . 2s. 6½d. per lb. basis

THE MINING MARKETS

The behaviour of Stock Markets this week provides solid encouragement. Although the expected election rise last Friday was not carried through when the House opened on Tuesday neither the railway strike, the stoppage at the docks nor easier sterling were formidable enough to dampen buyers. Prices were, of course, lowered but no selling pressure developed. By Wednesday hopes of an early settlement of the rail strike and an improvement in sterling to $2.79½ imparted a firm note and at the close markets were strong. Nevertheless, the better tone was more a function of hope than of an expanding volume of business.

Kaffirs were unsettled. London opened Tuesday under the influence of Johannesburg which had been open on Monday (Johannesburg closed on Tuesday for Union Day). There, gold shares were adversely affected by fears that the maiden return from Loraine would be disappointing and this kept the market idle. Loraine sagged to 8s. 9d., the lowest level since 1953 and plus signs were limited to Free State Geduld and St. Helena amongst O.F.S. issues.

On Wednesday with both centres operating, Kaffirs went better. No special reasons were advanced but persistent buying of Free State Geduld lifted the shares to £4½ and this, together with hopes of some good monthly returns, brought in buyers notably for President Brand and Stilfontein.

The Rand of O.F.S. returns for May were based on a gold price of 250s. 1d. per oz.—the same as for April. Loraine's maiden return showed a loss of £48,931; the tonnage throughput of 32,000 tons was satisfactory. Welkom's announcement of a working profit of £8,763 was disappointing as was the continued high loss incurred by Freddies Consolidated, this time of £49,903 against £50,487 in April. President Brand reported profits increased by £20,000 to £262,600. Harmony crossed the £100,000 a month profit mark and St. Helena reported £132,600, a rise of £11,000 over that recorded for April.
Blyvoor, in the Central Mining Group, revealed a working profit of nearly £500,000 while West Driefontein, in the Goldfields Group, disclosed a figure of £431,800 from a mill throughput of 70,000 tons.

West Africans and Australians were barely tested and what movement did take place was insignificant.

Coppers enjoyed a good market helped by the steady price of the metal and by Continental support. Rhokana, Nchanga, Chartered and Messina all participated in the rise, Nchanga opening on Thursday morning at £13 15/16ths—a new all-time high. The company's final dividend is due later this month. Rio Tinto was in demand and opened on Thursday morning at £58½ middle price. Messina firmed up on yield considerations on Tuesday and went ahead vigorously on Wednesday, advancing by ¾ to £8. This was due to the expected coming into operation of the company's new mine at Umkondo, in Southern Rhodesia. This is a small proposition, though a highly profitable one and it will add another 2,000 tons of copper concentrates to Messina's annual output. The total cost of bringing the mine into production would not have been more than £360,000.

Despite the firm tin price and the good March consumption figures there was not a large amount of business in this section. Kent was an exception on the extra payment for 1954. Beralts failed to hold all of their recent advance—although the price of wolfram is still rising. Nigerian tin/columbite issues were dull.

Elsewhere, Frontino responded to the improved dividend and expectations of a doubled interim payment for Consolidated Murchison, the antimony producer, brought in buyers.

Oils were an interesting if somewhat uncertain market. B.P.'s, Shell and Burmahs provided most of the interest. After being marked down sharply they rallied strongly and finished the week above their previous levels. Shells received an additional fillip from the publication of the quarterly earnings statement. Triad Oil advanced to new high levels.

Nickels were the centrepiece of Canadians and, following the announcement of the supply arrangement with Sherritt Gordon, moved ahead to $125.

Among miscellaneous, Turner and Newall were a good market on anticipated U.S. demand.

FINANCE	Price June 1	+ or — on week
African & European	3⅞	+ ⅛
Anglo American Corpn.	8⅛	—⅛
Anglo-French	20/9	.....
Anglo Transvaal Consol.	27/6	+ 1/3
Central Mining (£1 shrs.)	39/6	—3d
Consolidated Goldfields	59/4½	—7½d
Consol. Mines Selection	36/10½	.....
East Rand Consols.	2/6	+ 1½d
General Mining	4⅛	.....
H.E. Prop.	10/-	.....
Johnnies	36/3	+ 3d
Rand Mines	3½	.....
Rand Selection	41/-	—3d
Union Corporation	37/6	—6d
Vereeniging Estates	4½	+ ⅛
Writs	41/10½	.....
West Wits	40/-	+ 3d
RAND GOLD		
Blyvoors	29/-	—6d
Brakpan	6/3	+ 1½d
Buffelsfontein	33/6	+ 3d
City Deep	12/6	+ 3d
Consol. Main Reef	21/10½	+ 7½d
Crown	48/1½	+ 7½d
Daggas	56/3	.....
Dominion Reefs	32/6	—1/3
Doornfontein	26/-	—6d
Durban Deep	30/7½	.....
E. Champs	6/6	—3d
E. Daggas	10/9	.....
E. Geduld (4s. units)	29/-	+ 3d
E. Rand Props	3⅞	+ ⅛
Geduld	4⅛	—⅛
Govt. Areas	7/6	+ 6d
Grootvlei	20/-	+ 3d
Hartebeestfontein	31/6	+ 6d
Libanon	8/3	—1½d
Luipaards Vlei	21/6	.....
Marievale	19/9	.....
New Kleinfontein	7/6	.....
New Pioneer	14/-	—3d
Randfontein	55/-	.....
Robinson Deep	18/-	+ 6d
Rose Deep	13/9	.....
Simmer & Jack	3/7½	—1½d
S.A. Lands	23/9	.....
Springs	2/4½	.....
Stilfontein	27/3	+ 1/3
Sub Nigel	37/6	.....
Vaal Reefs	31/6	—6d
Van Dyk	3/9	.....
Venterspost	13/-	+ 1½d
Vlakfontein	16/3	+ 3d
Vogelstruisbult	31/3	.....
West Driefontein	5½	.....
RAND GOLD contd.		
W. Rand Consolidated	42/-	—6d
Western Reefs	40/7½	—7½d
O.F.S. GOLD		
Freddies	4/-	.....
Freddies Consolidated	5/9	.....
F.S. Geduld	4½	+ ⅛
Geoffries	16/3	—3d
Harmony	33/6	.....
Loraine	8/6	—1/9
Lydenburg Estates	20/7½	.....
Merriespruit	10/6	—3d
Middle Wits	16/6	+ 3d
Ofsits	3½	.....
President Brand	69/4½	—1/3
President Steyn	37/-	.....
St. Helena	29/3	+ 3d
Virginia Ord.	14/1½	+ 4½d
Welkom*	22/-	+ 1/-
Western Holdings	4⅜	—⅛
WEST AFRICAN GOLD		
Amalgamated Banket	2/4½	.....
Ariston	6/6	.....
Ashanti	23/6	.....
Bibiani	4/9	.....
Bremang	1/4½	.....
G.C. Main Reef	3/1½	—1½d
Kononga	3/-	+ 1½d
Lyndhurst Deep	1/3	.....
Marlu	1/3	.....
Taquah	2/3	.....
Western Selection	10/4½	—1½d
AUSTRALIAN GOLD		
Gold Mines of Kalgoorlie	13/-	+ 3d
Great Boulder Prop.	10/-	+ 3d
Lake View & Star	16/-	.....
Mount Morgan	19/3	.....
North Kalgurli	7/-	.....
Sons of Gwalia	5/-	.....
Western Mining	9/-	.....
MISCELLANEOUS GOLD		
Cam & Motor	8/4½	.....
Champion Reef	3/10½	.....
Falcon Mines	7/-	.....
Globe & Phoenix	23/6	.....
G.F. Rhodesian	6/4½	.....
Motapa	1/4½	.....
Mysore	4/4½	—4½d
Nundydroog	5/9	.....
Ooregum	4/6	.....
St. John d'El Rey	12/6	.....
Zams	48/9	.....
DIAMONDS & PLATINUM		
Anglo American Inv.	8½	.....
Casts	24/9	.....
Cons. Diam. of S.W.A.	7	.....
De Beers Defd. Bearer	6⅝	.....
De Beers Pfd. Bearer	15⅛	—⅛
Pots Platinum	8/-	.....
Waterval	14/4½	.....
COPPER		
Bancroft	40/9	+ 6d
Chartered	58/4½	+ 10½d
Esperanza	4/4½	—1½d
Messina	7⅛	+ ⅛
Nchanga	13⅜	+ ⅛
Rhod. Anglo-American	100/3	+ 2/9
Rhod. Katanga	18/6	—4½d
Rhodesian Selection	38/3	+ 2/6
Rhokana	38	+ 1¼
Rio Tinto	59¼	+ 1d
Roan Antelope	27/3	+ 4½d
Selection Trust	77/-	+ 3/9
Tanks	7	+ ⅛
Tharsis Sulphur Br.	7⅛	+ ⅛
TIN (Eastern)		
Ayer Hitam	32/-	+ 3d
Gopeng	9/-	+ 3d
Hongkong	7/3	.....
Ipoh	23/6	.....
Kamunting	7/6	.....
Kepong Dredging	3/4½	.....
Kinta Tin Mines	13/6	+ 6d
Malayan Dredging	8/10½	+ 3d
Pahang	11/6	+ 6d
Pengkalen	11/3	—3d
Petaling	9/4½	.....
Rambutan	18/6	.....
Siamese Tin	7/4½	—3d
Southern Kinta	18/1½	—1½d
S. Malayan	8/1½	+ 3d
S. Tronoh	10/6	.....
Sungei Kinta	12/-	.....
Tekka Taiping	6/3	—1½d
Tronoh	8/7½	+ 1½d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	13/-	+ 3d
Berak Tin	32/9	+ 1/3
Bisichi	7/1½	.....
British Tin Inv.	20/-	+ 1½d
Ex-Lands Nigeria	2/7½	.....
Geevor Tin	13/-	—1½d
TIN (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	2/3	.....
Jantar Nigeria	7/-	.....
Jos Tin Area	13/9	.....
Kaduna Prospectors	2/4½	.....
Kaduna Syndicate	2/6	+ 1½d
London Tin	7/6	.....
United Tin	2/1½	—1½d
SILVER, LEAD, ZINC		
Broken Hill South	52/9	+ 6d
Burma Corporation	2/9	+ 1½d
Consol. Zinc	47/9	.....
Lake George	12/3	—7½d
Mount Isa	50/9	—9d
New Broken Hill	35/9	—6d
North Broken Hill	73/9	+ 3d
Rhodesian Broken Hill	13/1½	+ 10½d
San Francisco Mines	23/6	—3d
Uruwira	6/7½	.....
MISCELLANEOUS		
BASE METALS & COAL		
Amal. Collieries of S.A.	48/6	.....
Associated Manganese	34/3	+ 9d
Cape Asbestos	10/9xd	—3d
C.P. Manganese	35/6xd	.....
Consol. Murchison	66/3	+ 1/10½
Natal Navigation	2⅝	.....
Turner & Newall	112/-	+ 1/-
Wankie	17/9	—3d
Witbank Colliery	4⅛	.....
CANADIAN MINES		
Dome	$30	.....
Hollinger	$44xd	+ 2½
Hudson Bay Mining	$115	+ ⅝
International Nickel	$125½xd	+ 8½
Mining Corpn. of Canada	£7½	.....
Noranda	$93	+ 2½
Quemont	£8½	.....
Yukon	4/4½	.....
OIL		
British Petroleum	95/6	+ 6d
Apex	29/-	+ 3d
Attock	47/6	—7½d
Burmah	6⅛	—⅛
Canadian Eagle	50/-	—3d
Mexican Eagle	21/9	.....
Shell	6¼	.....
Trinidad Leasehold	31/3	—3d
T.P.D.	23/-	—6d
Ultramar	32/-	+ 1/3

COMPANY NEWS AND VIEWS

Anglo American Corporation's Investments

The full report and accounts of the Anglo American Corporation of South Africa for the year ended December 31, 1954, showed that the market values of its quoted investments at £65,985,402 were virtually double the figure of £33,191,344 recorded for the previous year. Unquoted investments amounted to £32,082,906 compared with £28,463,031. Current assets at the figure of £57,315,414 (£37,530,608) exceeded current liabilities and provision for taxation by about £2,200,000. Cash holdings as at December 31 amounted to £29,745,397 (£19,822,079). Total capital and reserves of the Corporation rose to £31,683,947 from £27,666,173.

As previously reported net profits earned during the past financial year, after a provision of £862,298 (£572,000) for taxation, rose to £4,999,557 from £3,892,813. The unappropriated profit carried forward moved up to £721,840 from £612,988 previously. Sir Ernest Oppenheimer is chairman. Meeting, Johannesburg, June 24.

Increase in Central Mining's Net Assets

The report and accounts for the Central Mining and Investment Corporation and its subsidiaries in respect of the year ended December 31, 1954, discloses an improvement in the net asset position from £10,922,080 to £12,108,779. Balance sheet values of shares, investments and interests are shown at £8,859,468 as compared with £8,730,393. The quoted proportion of these holdings amounting to 98.1 per cent had a market value as at December 31, 1954, of £16,825,906 (£14,111,265). Current assets, which included British and South African Government securities having a market value of £7,531,624, were shown at £18,403,743 (£19,506,503). A net liquid asset position of some £3,100,000 was disclosed. Cash holdings amounted to £7,222,776 (£814,261). Presumably reflecting the realization of government securities during the past year.

Group profits before tax rose to £1,371,105 from £1,168,899. Tax absorbed £569,533 (£301,384). The balance carried forward was increased to £257,338 from £233,766. Lord Baillieu is chairman. Meeting, London, June 20.

Expansion of General Mining

Reflecting the acquisition of Strathmore Consolidated Investments during the year ended December 31, 1954, a sharp expansion in the interests of the General Mining and Finance Corporation has been disclosed by the Consolidated balance sheet. Quoted investments at December 31 last were accorded a stock exchange value of £16,064,360 (£9,577,117) compared with a book value of £8,295,046 (£5,505,856). Unquoted holdings at cost less amounts written off had a balance sheet value of £1,611,906 (£502,764). Fixed assets moved up to £1,301,269 from £756,504 while current assets including cash holdings amounting to £5,819,782 (£2,108,324) were shown at £8,100,632. After deducting current liabilities the net liquid asset position totalled some £500,000. Net profits earned by the Corporation during the past financial year rose to £1,374,808 from £933,331. After dividends which absorbed £1,228,996 (£894,618) and transfers to reserves together with amounts written off the balance carried forward increased to £300,169 from £198,444 previously.

In accordance with the recent issue of "S" ordinary shares in connection with the acquisition of Strathmore Consolidated Investments the designation of these shares will be changed by the deletion of the letter "S" with effect from June 1, 1955. Their designation will subsequently become ordinary shares of £1 each which will rank *pari passu* in all respects with the existing ordinary shares of the Corporation.

Sir George Albu is chairman and managing director. Meeting, Johannesburg, June 23.

Gold Fields Group Company Meeting

Several annual meetings of mines comprising the Consolidated Gold Fields group, which ended their financial year on December 31, 1954, have recently been held. Amongst these was that of *Vogelstruisbult Gold Mining Areas* at which the chairman stated that normal operating conditions should be attained by the company's uranium plant during the current quarter. Trial runs of this plant were commenced in December last and full production was not begun until towards the end of February. Profit from sales of uranium, it was stated, should add materially to cash resources during the remainder of 1955. On the other hand, it was emphasised that with the cessation of expenditure on the uranium plant the amount of taxation redemption allowance would decrease in 1955 and progressively thereafter. The result of this would be that taxation—which had previously been running at a much reduced level—must be expected to rise to high levels again in the near future. In addition, further taxation could be expected on increased profits from uranium when normal production of this material is reached. At *Rietfontein Consolidated Mines*, an improvement in both percentage payability and values disclosed was achieved. This was attributable mainly to results obtained in the new lease area to the east of No. 3 shaft and in the No. 3 shaft area adjacent to the new lease area. Encouraging results continued to be obtained during the year from the re-investigation old areas. A total of 77,128 tons—or 23.4 per cent—of the tonnage milled was drawn from stopes not included in the ore reserve. With the development of the new lease area nearing completion an increasing proportion of development would be directed towards re-investigation of old areas. The decrease in ore reserves by 370,000 tons at *Simmer and Jack Mines* was due mainly to further disappointing development of depth in the west sub-vertical shaft area and in the central and eastern sections of the mine. In all these sections payability continued to be lower than was expected and this has made it impossible to replace tonnage at the rate at which it is being mined. Towards the middle of the year development was curtailed and work was concentrated in the more promising zones with a consequent reduction in expenditure.

The past financial year of *Vlakfontein Gold Mining Company* was notable for maintenance of production at full capacity and for the completion of the sinking of No. 2 shaft. Following the cessation of capital expenditure on the new shaft, the company subsequently decided to increase plant milling capacity from 38,500 tons to 50,000 tons monthly. Further appropriations for this work will be made during the period 1955-1957 and will amount to about £350,000. Should expansion programme proceed according to plan, working profits should rise in 1956 above the present level, the benefit of the programme being obtained in 1957. Providing operating conditions remain favourable—with present cash resources and rising working profits in prospect—no difficulty should be experienced in meeting the necessary capital expenditure out of revenue. At the same time, the payment of dividends, possibly on an increasing scale, during the period of expansion should be permitted.

An interesting comment which was made in all of the above statements concerned the undistributed profits tax announced by the Union Minister of Finance in his budget speech on March 24, 1955. While this tax is at present not applicable to mining companies the Minister has stated that he will reconsider this aspect of the matter before the next session.

Virginia and Merriespruit Meetings

At the meeting of Virginia Orange Free State Gold Mining Company the chairman announced that the milling capacity of the reduction plant had been extended from 50,000 tons to 75,000 tons per month. The tonnage milled, which averaged 49,000 tons per month for the first six months of production would be progressively increased to the present capacity as additional stope faces became available for mining. It was anticipated that the milling rate would reach 75,000 tons per month during the fourth quarter of the current financial year. Referring to the uranium and pyrite recovery plants he anticipated that these installations would be commissioned during the third quarter.

Although it was previously intended that the final depth of the Merriespruit (Orange Free State) Gold Mining Company's shaft should be approximately 4,520 ft. it was decided to stop sinking at a depth of 3,779 ft. The reason for this alteration of plans, the chairman stated, was to expedite development and stoping operations down to the 35th level. The area below this horizon would be explored by means of incline haulages and development on reef. Referring to the work in progress on the erection of the reduction plant, he expected that trial milling operations would be commenced during January 1956.

Mr. S. G. Menell is chairman of both companies. Meetings, Johannesburg, June 23.

Progress of Freddies' Exploratory Development Programme

At the meeting of Freddies Consolidated Mines held recently at Johannesburg, the chairman of the company, spoke about the exploratory development programme which has been intro-

duced to investigate the unknown areas to the east and west of the present line of workings. Within the past two months the very limited footage of exploratory development accomplished had not disclosed any diminution in the severity of faulting encountered. Furthermore, there had been no improvement on past average values obtained. It was stressed, however, that the footage so far developed was insufficient to provide as yet any evidence of conditions in the areas ahead.

The question of finance is of paramount importance to a company. And the period of time during which the programme will be continued depends primarily upon the funds available. This factor depends in turn upon the degree to which the present earning capacity of the mine can be increased. The task of increasing revenue remained one of great difficulty. Nevertheless, so long as funds were available the programme will be continued for as long as there were reasonable grounds to hope that additional ore reserves of satisfactory value might gradually be built up.

Although it was too early to determine accurately the profits which would arise from uranium operations, it was indicated that for the remainder of the year net revenue from this source should be about £15,000 to £20,000 per month. This very approximate estimate did not include any provision for loan repayments and interest as these would not become due during 1955.

Reef Strikes at Merriespruit No. 2 Shaft

An announcement from Merriespruit (Orange Free State) Gold Mining Company states that the conglomerate at the base of Elsburg has been intersected at a depth of 2,937 ft. below the collar of No. 2 shaft. Full exposure of the reef over the periphery of the shaft was completed at a depth of 2,941 ft. below the collar. Reef samples at 10 ft. intervals around the periphery of the shaft were taken and 9 sections sampled average 6.80 dwt. over a channel width of 24.1 in. equivalent to 164 in dwt.

Two bands of the Leader Reef were also intersected between depths of 3,189 ft. and 3,203 ft. and between 3,207 ft. and 3,212 ft. respectively below the collar. But sampling of these bands gave negligible values. The horizon of the Basal Reef was intersected at a depth of 3,262 ft. below the collar. This reef was not developed and the sampling of content between the normal hanging-wall and footwall strata also gave negligible values.

"Some Overall Increase" Expected in Randfontein's Uranium Profits

At the meeting of the Randfontein Estates Gold Mining Company the chairman, in his statement to shareholders, disclosed that the expansion of operations on the Bird Reefs should result in "some overall increase" in combined profits from uranium and gold production. The extent of this increase was difficult to forecast at the present time during which a part of operations at the mine still concerned the transfer of operations to the Bird Reef sections. Also of especial interest was the statement that the company would probably not be liable to any tax before 1957.

Operations May Cease at New State Within 18 Months

At the annual meeting of New State Areas the chairman stated that on present indications operations may cease within approximately 18 months. The treatment of accumulated slimes, he said, yielded a small profit but the continuation of this operation depended upon values disclosed as accumulated slimes were removed for treatment. Meanwhile, the sale of salvaged material and assets continued. As surplus funds become available they will be paid to shareholders in the form of returns of capital. It was not possible, however, to indicate when the next distribution would be made. During the first four months of the current year 6,578 oz. of gold were recovered from the treatment of old residues. Receipts from sales of this gold, together with machinery, plant and scrap, etc., exceeded expenditure during the period by £15,500. Estimated taxation was £2,670.

Government G.M.A.'s Increase in Costs

Owing to rising working costs and decreases in revenue per ton milled together with the margin of profit made by Government Gold Mining Areas from gold operations has declined substantially over the past five years since devaluation. At the present time, the chairman of the company in his statement to shareholders revealed that the margin on gold was no more than 1s. 3d. per ton. Profits earned during April from gold declined and a further drop in profits was likely to be suffered in respect of May. It was not possible, he said, to increase appreciably the grade of ore sent to the mill and the profitability of the mine was largely governed by the success of efforts to reduce working expenditure.

Some alterations to the company is pyrite plant—which during the past financial year yielded a net profit of £55,501—would be made during the current year. This would slightly increase the present rate of production and will cost approximately £30,000.

Burmah Oil's Higher Profits: 100 Per Cent Scrip Issue

Although a further increase in the volume of sales in each sphere of the Burmah Oil Company's activities in 1954 was again accompanied by a somewhat lower profit margin, net earnings have shown a substantial increase over the previous year.

Year to Dec. 31	*Total* Profits*	*Taxation*	*Net Profit*	*Dividends*	*To Reserve*	*Carry Forward*
	£ (000)	£ (000)	£ (000)	£ (000)	£ (000)	£ (000)
1954	8,083.0	4,354.2	3,728.9	2,614.4	1,100.0	610.9
1953	7,667.1	4,424.8	3,252.3	3,252.0	1,100.0	596.4

* Includes trading profit £3,855.0 (1953-£4,095.2) and dividends and interest £4,228.0 (1953-£3,581.9)

Dividends on the company's issued ordinary stock of £20,604,770 amounted to 21 per cent as compared with 17½ per cent in respect of the previous year.

It is announced that application has been made to the C.I.C. for permission to capitalize £20,604,770 from capital reserve and to distribute ordinary shares by way of a 100 per cent free scrip issue. Although the date of this issue has not yet been fixed the new shares are to rank for dividend in respect of the period from January 1, 1955.

In his statement to shareholders Sir Kenneth D. Harper, the chairman, referred to the vigorous exploration which is being carried out by Pakistan Petroleum in which Burmah Oil has a 70 per cent interest. Following seismic survey of the Uch Area in West Pakistan about 35 miles from the Sui gas field a test well was spudded in February, 1955, and high pressure gas has been encountered. First indications are that Uch will produce a substantial supplement to the gas supplies from Sui. Drilling is being continued in the hope of striking oil at a deeper level. Further drilling by Pakistan Petroleum on the Sui field has shown that gas reserves are even larger than originally estimated.

Quoted investments shown on the company's balance sheet as at December 31, 1954, amounted to £10,714,505. These securities had a market value of £127,052,750 (£56,279,335). Meeting, Glasgow, June 24.

Consolidated Murchison's Higher Antimony Output

During the year ended December 31, 1954, due to the improved demand for the metal, the activities of Consolidated Murchison (Transvaal) Goldfields and Development Company were chiefly directed towards the extraction of antimony concentrates. As a result of this from the total of 85,188 tons milled 14,977 s.tons of concentrates and cobbed ore were produced. This compared with a total of 4,773 tons of concentrates and ore produced from 71,300 tons milled during the previous year. On the other hand, gold production showed a sharp decline to 5,433 fine ounces from 9,252 fine ounces.

Year to Dec. 31	*Total* Revenue*	*Working Costs*	*Taxation*	*Net Profit*	*Dividends*	*Carry Forward*
	£	£	£	£	£	£
1954	1,021,001	262,595	215,000	522,345	478,400	495,093
1953	564,781	258,374	66,000	248,776†	124,800	466,405

* Includes sales of antimonial concentrates £943,647 (1953-£443,320) : Gold £67,626 (1953-£115,478) : Other income £9,685 (1953-£5,932)
† After credit £30,000 recovery from insurance.

Dividends on the issued ordinary capital of £208,000 in shares of 5s. total led 230 per cent as against 60 per cent in respect of the previous year.

Mr. S. G. Menell, the chairman, in his statement to shareholders announced that the demand for antimony had been well maintained up to the end of April, 1955. The company had concluded no long term contracts for sales of this metal. Stocks of ore and concentrates are being kept at the level necessary to ensure that orders can be readily fulfilled. This would also place the company in a good position to meet any additional future demands should they arise. These statements, coupled with the disclosure that development work

designed to open up the lower levels of the Gravelotte Section and to provide additional ore reserves, will no doubt be taken by many as representing an optimistic view of the future.

At their present price of about £3 6s. 0d. the 5s. ordinary shares yield slightly over 17 per cent. Meeting, June 20, Johannesburg.

Western Selection and Development Group March Quarterlies

The rise in profits which has recently taken place at Amalgamated Banket Areas ceased during the quarter ended March 31, 1955, when earnings recorded a fall of some £45,000 from those of the previous three months. This was due to the lower total amount of gold recovered at 37,884 f.oz. against 39,998 f.oz. As regards development in the Abbontiakonn, Taquah/Mantraim section there was a sharp advance in the total footage payable to 1,530 ft. from 750 ft. Values obtained were 8.95 dwt. over 31.17 in., as compared with 8.05 dwt. over 41.9 in. At Tamsoo also footage payable rose to 535 ft. from 335 ft. in the previous quarter. Values were 6.5 dwt. over 39 in. as against 6.7 dwt. over 36.6 in. In the Fanti area the grade obtained from 15 ft. sampled was 5.6 dwt. over 36 in. which represented a considerable drop from 6.7 dwt. over 41.2 in. from the 25 ft. sampled during the preceding three months.

A slight decline in profits took place at Ariston. But the most important news concerning this property concerned the new winder which was finally commissioned on January 30 and is running satisfactorily. Development at No. 2 orebody on Nos. 16 and 18 levels is approaching the Southern end of the ore shoot. The true value of the block of ore concerned can, however, only be proved by extensive stope driving between the 19th and 15th levels. It is anticipated that a considerable tonnage of payable ore will be proved in this area.

Several adverse factors combine to bring about the substantial fall in Bremang's profits. No. 3 dredge was shut down for ten days in March for overhaul, while No. 4 dredge was shut down for five days in January owing to a transformer fault. Losses were recorded by both Nos. 2 and 4 dredges. In addition, a working loss was made by No. 1 dredge during the initial period of production since its reconstruction. This work was completed by March 8 when dredging was commenced on the Bremang Extended Areas (Offin River). This dredge is now expected to make good returns.

Company	*June qtr. 1954*	*Sept. qtr. 1954*	*Dec. qtr. 1954*	*Mar. qtr. 1955*
	£	£	£	£
Amalgamated Banket	79,954	102,980	146,236	120,979
Ariston Gold Mines	165,418	178,471	153,046	137,381
Bremang Gold	907	36,367	20,350	4,924
Gold Coast Main Reef	45,390	60,383	49,871	32,391

At Gold Coast Main Reef a fall in tonnage to 27,875 tons from 29,319 tons in the preceding three months, together with a decline in gold produced to 10,055 oz. from 11,823 oz., resulted in lower profits being earned.

In view of Marlu's impending liquidation, no return has been received and the company's name has therefore been removed from our table.

Success of Vaal Reefs' Issue

Of the 2,190,000 5s. shares offered to members of Vaal Reefs Exploration and Mining Company at a price of 30s. per share in the ratio of three for ten, 95 per cent has been subscribed. The balance of 3 per cent was subsequently subscribed in accordance with the underwriting agreement.

Offer For Tati Company Accepted

It has been announced that the offer by Glazer Brothers Investments Rhodesia (Private) to acquire the whole of the issued shares of The Tati Company at a price of 21s. per share, has already been accepted in respect of approximately 93 per cent of the equity. The offer has accordingly become unconditional.

Mr. Charles Emmoney, many years senior ore and metal sampler of Daniel C. Griffith and Co., retired at the end of May after having served as an active member of the staff for 65 years. He joined the firm in 1890, and spent many years under the direct tutelage of Mr. Daniel C. Griffith who founded the business 100 years ago.

Mr. Emmoney was held in the highest esteem not only by his fellow workers, but by many who knew him in the ore and metal industries, for he travelled extensively in the United Kingdom and abroad.

Going to Australia or New Zealand?

Business men and others will find all practical information in the Australia and New Zealand Bank's free travellers' guides to Capital Cities. Each contains city and suburban maps together with lists of hotels, theatres, public buildings and other points of interest to visitors. These pocket guides cover Sydney, Melbourne, Perth, Adelaide, Brisbane, Wellington, Auckland and Christchurch. Copies of any of these guides will be gladly sent on application to the Overseas Department.

AUSTRALIA AND NEW ZEALAND BANK LIMITED

Head Office: 71 CORNHILL, LONDON, E.C.3.

THE CONSOLIDATED ZINC CORPORATION

RESULTS SHOW A SATISFACTORY INCREASE

The sixth annual general meeting of The Consolidated Zinc Corporation Limited will be held on June 22 at 37 Dover Street, London, W.

The following is an extract from the circulated statement of the Chairman, **Mr. John R. Govett:**

The results for 1954 show a satisfactory increase over the previous year and reflect the higher prices realized from sales of lead and zinc, the profit before taxation amounting to £4,696,142, compared with £2,516,562 for 1953, an increase of £2,179,580. This result is arrived at after charging depreciation of £942,673, compared with £837,471 for 1953. Taxation absorbs £2,229,409 compared with £1,043,799 for 1953.

The net profit for 1954 amounts to £2,383,378, compared with £1,393,022 for 1953. Provisions set aside in previous years and now no longer required, amounting to £141,490, have been credited to the Consolidated Appropriation Account. Transfers to general reserves have been made of £1,500,000, which compares with total transfers in 1953 of £1,130,000.

An interim dividend of 1s. 3d. per share, compared with 1s. per share for 1953, was paid on January 1, 1955, and a final dividend of 2s. 6d. per share is being recommended payable on the Capital increased by the rights issue in December, 1954. The balance on the Consolidated Appropriation Account carried forward at December 31, 1954, amounts to £905,445, an increase of £61,475 over the balance at December 31, 1953.

CAPITAL EXPENDITURE

Capital expenditure during the year on buildings, plant, machinery and equipment amounted to £1,049,116 (compared with £1,470,053 for 1953).

To make provision for the present programme of capital and exploration expenditure up to the end of 1956 and towards future projects and contingencies, an issue was made in December last of 2,182,649 Ordinary shares of £1 each.

An important step in the integration of the Group was taken in January, 1955, when an offer was made to holders of Imperial Smelting Corporation Limited 6½ per cent. Preference shares to exchange their shares for 4½ per cent. Preference shares in the parent company, and this offer has been accepted by holders of 99 per cent. of the shares.

In my statement last year I suggested that at the then current level of costs a combined lead/zinc price in the United Kingdom of £175 would prove satisfactory to our interests, and it so happened that the combined price for the past year closely approximated this figure.

This happy coincidence and the higher prices in the opening months of the current year do not, I fear, result from a balance between production and consumption over the period, but rather from an important decision taken by the United States Administration in August. Previously there had been much agitation in the United States for official action to stem the high rate of imports and various suggestions were made to achieve this objective. Increased tariffs, sliding scale tariffs, excise taxes, and import quotas were all under consideration. The Administration, however, preferred to rely on stockpiling to give the necessary relief to the U.S. mining industry. During the past nine months deliveries of both lead and zinc to the stockpile have been on a sufficient scale to allow the stocks of these metals to fall to a comfortable level. Gradually increasing consumption of both metals has also narrowed the gap between supply and demand, but there is little doubt that if present prices are maintained by any artificial stimulus there will be a tendency for production to increase rather more rapidly than consumption. If, therefore, the prop which the stockpile has given to the market were to be removed a fall in prices could be anticipated. However, purchases that will have been made by the stockpile in the first year will fall well short of the target that was originally envisaged and it has recently been announced that the operations of the stockpile will be continued for a further period. I trust, however, that such purchases will be so adjusted that greater stability can be created in the metal markets of the world.

The summary of activities published with the report and accounts shows that the year's operations have achieved increased output and improved efficiencies in all the major branches of our activities.

Given freedom from any major disturbance in world affairs we can, I feel, look forward to the future with confidence

NEW BROKEN HILL CONSOLIDATED

SUBSTANTIAL PROGRESS TOWARDS PRODUCTION TARGET

MR. JOHN R. GOVETT ON A HIGHLY SATISFACTORY RESULT

The 19th annual general meeting of New Broken Hill Consolidated Limited will be held on June 22 in London.

The following is an extract from the circulated statement of the Chairman, **Mr. John R. Govett:—**

The profit for the year 1954, before providing taxation, amounted to £1,141,234, compared with £677,922, an increase of £463,312. This result, which I think may be regarded as most satisfactory, is due partly to the substantial increase in production and partly to the higher prices realized for lead and zinc. The tonnage of ore milled reached a total of 483,461 tons, compared with 403,662 tons for 1953.

Depreciation has been provided, amounting to £307,000, compared with £277,400 for 1953. The charge for taxation on the year's profit amounts to £543,960, compared with £264,660 for 1953. This leaves a net profit for the year of £597,274 compared with £413,262 for 1953, an increase of £184,012.

The Board have transferred to General Reserve the sum of £200,000, compared with £250,000 in 1953. An interim dividend of 1s. 3d. per share was declared in November, 1954, and the Board now recommend that a final dividend of 1s. 9d. per share be paid, making a total distribution for the year of 3s. per share, which compares with 1s. 6d. per share for 1953. These dividends, payable less income tax, require £384,454, leaving a surplus of £270,007 to be carried forward, a small increase of £12,820 on last year's balance.

Capital expenditure during 1954 amounted to £345,858 on mine development, including shaft sinking, and £304,203 on machinery, plant, buildings and equipment, giving a total of £650,061.

PRODUCTION AND ORE RESERVES

The total production for 1954 was 482,058 tons (lead averaging 9.4%, silver 2.1 ozs. and zinc 14.4%) as compared with a total for 1953 of 405,629 tons (lead 8.8%, silver 2.0 ozs. and zinc 13.7%).

The ore reserves fully outlined and developed ready for stoping, or in process of being stoped, show a further satisfactory increase, and at December 31, 1954, were 2,800,000 tons assaying 11.1% lead, 2.7 ozs. silver and 11.9% zinc, as compared with 2,500,000 tons assaying 10.9% lead, 2.7 ozs. silver and 11.4% zinc.

The service shaft, the sinking of which was completed to a depth of 3,194 feet at 28½ feet below the No. 22 Level in March, 1954, was fully equipped and in operation to the No. 22 Level in January of this year.

After referring to the main general development during the year under review, the statement continued:

Following the completion in 1953 of the original programme of surface construction, the only major work subsequently carried out has been the addition of a second section of the mill to enable it to treat 540,000 tons per annum. The buildings for the new section were completed by the end of last year and the equipment is now being installed. It is expected that the new section will be in full production in September.

I know shareholders will again wish to join me in a tribute to our management at Broken Hill and the staff and employees there for the further substantial progress made in 1954 towards our present goal of 540,000 tons of ore per annum. This rate of production should be fully achieved as soon as the underground crusher station and extension of the mill are completed before the end of the current year.

The moderate increase in the average prices of lead and zinc over the year compared with 1953, together with the increased production, has secured for us in 1954 the greater part of the improvement in profit which was forecast for 1955 in the prospectus for the Unsecured Loan Stock issued in February, 1954. As a result, after providing for the proposed dividend, our financial resources, reinforced by the transfer to reserve and the funds obtained from the issue of the Unsecured Loan Stock early last year, place us in a strong position to meet possible vagaries in the metal markets and the demand likely to arise for future mine development, including any development of the low grade ore-bodies within our leases which we consider will ultimately prove a substantial additional asset.

Prices in the opening months of the current year have remained well above those of the corresponding period of last year, and I have every reason to expect that our results for this year will be no less favourable than those I have been able to put before you today.

THE BURMAH OIL COMPANY LIMITED

INCREASE IN GROUP SALES

The fifty-third annual general meeting of The Burmah Oil Company Limited will be held on Friday, June 24, 1955, in the Merchant's Hall, 30 George Square, Glasgow.

The following statement by the chairman, **Sir Kenneth B. Harper,** has been circulated with the directors' report and accounts for the year ended December 31, 1954 :—

Since our last Annual General Meeting two of your Directors have been signally honoured by Her Majesty. At the New Year a Barony was conferred on Sir William Fraser and Lord Bilsland has recently been appointed a Knight of the Thistle. In the last New Year's Honours List also Mr. M. J. Condon, who manages your interests in West Pakistan, was made a Commander of the Order of the British Empire. To all three we offer our warmest congratulations.

As was recently announced in the press, Mr. W. E. V. Abraham has asked to be relieved of the duties of Managing Director and retired from the Company's service on April 30, 1955. He will remain on the Board so that his advice and the experience of 35 years of notable service with the Company may continue to be available to us.

We are fortunate in having as his successor Mr. W. E. Eadie, who by experience and ability is particularly well fitted to assume the responsibilities of Managing Director.

Mr. R. P. Smith has been appointed a Director. Mr. Smith served Burmah-Shell in India for 24 years before joining your Company's London staff and the Board expects to receive valuable assistance from his knowledge and judgment.

Mr. E. Colman, after 21 years as Secretary to the Company, has decided to retire and will hand over his office to Mr. D. Andrew on July 1. We wish Mr. Colman the long and happy retirement to which his loyal, valuable and efficient service so well entitles him.

ACCOUNTS

Last year, when comparing the 1953 results with those for 1952, I drew attention to a small increase in the volume of our Group sales and also to a slight reduction in profit margins. This year I am able to report a further increase in the volume of sales in each sphere of activity, although again this is accompanied by somewhat lower profit margins. After charging the cost of a comprehensive programme of exploration and including our interest in the trading of The Burma Oil Co. (1954) Ltd., the Group's trading profit for the year was £5,131,211, compared with £5,330,987 in 1953.

The deduction for depreciation amounts to £1,276,163, which corresponds closely to the charge in 1953.

Income from dividends and interest this year at £4,228,005 is £646,093 higher than last year, due mainly to increased dividends from The British Petroleum Co. Ltd. and certain trade investments and to the receipt of dividends for the years 1952 and 1953 from The Tinplate Company of India, Ltd.

Full provision has been made for U.K. and overseas taxation which absorbed £4,354,184 against £4,424,792 in 1953. Together with the balance of unappropriated profit of £596,411 brought forward from 1953 the total available for disposal becomes £4,325,280.

Your Board have allocated £1,100,000 of this amount to General Reserve and have set aside £1,599,445 for a final dividend of 13¼ per cent. which they recommend should be paid on the Ordinary Stock. After providing for this final dividend and the interim dividend of 7½ per cent. paid on November 19, 1954, together with the dividends on the Preference Stocks, the balance of unappropriated profit carried forward is £610,888.

I draw your attention to that part of the Directors' Report which sets out our proposals for revaluing our direct and indirect investment in The British Petroleum Co. Ltd. and, subject to the agreement of the Capital Issues Committee, for the *pro rata* distribution of shares to stockholders. There is nothing I need add here to what is contained in the Directors' Report.

The Burma Oil Co. (1954) Ltd. started to operate in Burma as from January 1, 1954, and this involves a change in the Parent Company's Balance Sheet. The cost of our investment in the new Company is now included in Shares in Subsidiary Companies with a consequent adjustment of Advances. The reduction of Stocks of Stores and Materials, and consequently of the finance tied up in them, is also reflected in the reduction of Advances by the Parent Company.

The ordinary share capital of The Burma Oil Co. (1954) Ltd. is the equivalent of £15,000,000. Your Company holds slightly over 55 per cent. of this equity and the Union Government 33⅓ per cent. The balance is held by Indo-Burma Petroleum Co. Ltd. and The British Burmah Petroleum Co. Ltd. A first payment of £2,500,000, of which your Company's share is £2,066,813, has been received from the Union Government in respect of the shares they have acquired. The balance is due to be paid by instalments or in one lump sum at the Government's option and your Company's share of this balance is shown in the Balance Sheet as a Loan to the Government of the Union of Burma. £51,670 of this loan has since been received.

The increase in Trade Investments results from your Company's share of the further capital required by Burmah-Shell Refineries Ltd. and from an investment of just over £1 million in the Sui Gas Transmission Co. Ltd.

During the year we received free issues of £21,371,940 British Petroleum Co. Ltd. Ordinary Stock and £404,800 Shell Transport and Trading Co. Ltd. Ordinary Stock.

TRADING

Our Group's share of the total trade in all petroleum products (excluding wax and candles) in Burma, India and Pakistan was 4.5 per cent. higher in volume than the corresponding figure for 1953 but there was, as I have already noted, a slight reduction in profit margins.

Assam Oil Company's production of wax during the year was the highest in its history and Burma started to produce wax again for the first time since 1942. Expanding demand in world markets enabled us to sell all our increased production and at somewhat better prices than in the previous year.

BURMA

Indigenous and Imported Oil shared the trade in Burma about half and half. Total sales were some 11 per cent. higher than in 1953, a small part of this increase being attributable to an improvement in security conditions.

PAKISTAN

Pakistan is at present a small motor spirit market, an average kerosine market, by Eastern standards, and a substantial user of fuel oils. The Group's sales of kerosine showed a small increase over the previous year, which would have been larger but for restrictions on the importation of tinplates involving foreign exchange. Some offtake of fuel oils was lost through the Eastern Bengal Railway converting a further number of their locomotives back to coal, but there are other developments in East Pakistan which should materially increase the demand for these oils.

INDIA

There were substantial increases in the Group's trade in all products in the Assam Oil Company's sphere, while in the rest of India the increases were mainly in kerosine and fuel oils.

World trade of motor spirit increases steadily year by year and in the last three years, outside the Iron Curtain, the progressive increases have been 5 per cent., 6 per cent, and 4 per cent. One would normally expect that in an under-developed country like India, working to a deliberate programme of industrial expansion, consumption of motor spirit would increase by more than the world average, but that has not in fact been the case. Offtake has stood still during 1953 and 1954, and in both years has been slightly lower than in 1952. This is ascribed to a combination of factors—sales taxes on motor spirit by States (or Provinces as they used to be called) on top of substantial Central import duties, States' taxation of motor vehicles, vehicle licensing policies and the threat to nationalize motor transport. There has also been an increasing use of diesel vehicles, especially by State transport organizations, resulting in some transfer of motor spirit trade to automotive diesel fuel.

I have commented in previous statements on the damaging effect of high taxation on the development of motor transport. In India import duty on motor spirit has stayed at 15 annas 9 pies (or about 1s. 6d.) per gallon since 1951. That is a Central duty. States have the power to impose sales taxes on the same product and are using it to an extent varying in different States from 2 annas to 6 annas per gallon.

One can understand the attraction to Goverments of taxation on motor spirit; it brings in substantial revenue and costs so little to collect. But whatever advantages Governments may get out of taxing motor spirit, there comes a time when they can be obtained only at the expense of the development of motor transport, and of the important part it played in the development of the country as a whole. That point seems to have

been reached in India, and this in spite of the increasing mileage of new roads and the improvement of road surfaces, as evidenced by sales of bitumen, which for the last three years have been 102,000, 125,600 and 168,700 tons. The figures suggest that the use of motor transport is not responding to the increase in motorable roads. It is to be hoped that the Central and States Governments will review their motor spirit and vehicle taxation policies in the light of the effect of these policies on their development plans.

PROSPECTING, OILFIELD DEVELOPMENT AND REFINING OPERATIONS

BURMA

There appears to be some possibility that improvement in security conditions may permit resumption of a geophysical survey of the Irrawaddy Delta area and this is now under investigation. Stockholders are aware that no exploration work has been feasible in Burma since the war.

The Burma Oil Co. (1954) Ltd. is now producing and refining crude oil from the concessions formerly held by the three participating Oil Companies and the products are sold through the agencies of our Burma Trading Company and Indo-Burma Petroleum Co. Ltd.

The "1954" Company has begun to rebuild at Syriam, near Rangoon, refining facilities which, combine with the existing facilities at Chauk, will make Burma self-sufficient in main petroleum products. The Union Government have undertaken that their nationalized Inland Water Transport organization will provide sufficient tug and barge capacity to transport crude oil from Chauk to Syriam.

I can still report no more progress in the matter of our "denial" claims against the Union Government than a slight advance in the preparatory steps towards the hearing of the preliminary legal issue of that Government's liability under the Defence of Burma Act, 1940.

INDIA

As is a not uncommon experience, drilling results at Nahorkatiya have shown that the structure is geologically very complicated and further drilling will have to be done before the extent of the oil pools and the probable oil reserves can be reliably estimated, but I can say that results to date continue to be encouraging. In the meantime some crude oil is being piped to Digboi, where the refinery throughput has been increased by 50 per cent.

As a result of evidence obtained from geophysical surveys in the Upper Assam Valley, Assam Oil Company, Ltd., has applied for prospecting rights over a number of further areas.

The new two million ton refinery built at Trombay Island at Bombay by Burmah-Shell Refineries Ltd. came on stream in January 1955 and is expected to be in full operation by about the middle of the current year.

PAKISTAN

Pakistan Petroleum Ltd., in which your Company has a 70 per cent interest, is continuing to explore vigorously in both West and East Pakistan. Following a seismic survey of the Uch area in West Pakistan, about 35 miles from the Sui Gas field, a test well was spudded in in February 1955 and high pressure gas has been encountered. The first indications are that Uch will produce a substantial supplement to the supplies of gas from Sui. Drilling is being continued in the hope of striking oil at a deeper level.

Further drilling by Pakistan Petroleum Ltd. on the Sui Field has shown the gas reserves to be even larger than originally estimated and a fresh appraisement is being made. The laying of the Sui Gas Transmission Company's main pipe line was completed in April 1955. The line is now being tested and deliveries to consumers are expected to begin in August.

Three related structures in this part of Baluchistan have now been drilled, namely at Sui, Zin and Uch. Gas has been found in all three, though at too low a pressure in Zin to be a commercial proposition. Other structures in this region remain to be tested. The Pakistan Government are as anxious as we are to find oil in one or more of them, as imports of oil are a heavy burden on their foreign exchange.

After a seismic survey of the structure near the town of Sylhet in East Pakistan, a test well was started in January this year.

In East Pakistan good progress was made at Chittagong with the new Ocean Installation which should be in full operation in a few months' time.

PRIVATE ENTERPRISE IN INDIA

It is becoming increasingly difficult to be sure just how welcome private enterprise is in the India of to-day. The Prime Minister, Mr. Nehru, has proclaimed that India's aim is a socialist economy in which there is to be a planned expansion of industry; that in this socialist plan there is to be a public sector and a private sector; that the former will predominate but there will still be room for private enterprise because the policy will be to promote new state industries and, except in special circumstances, not to "nibble into the private sector"; to do the latter would be wasting the available resources because it would not add to the total development. Other responsible Ministers have declared that foreign capital will not only be admissible but will be necessary to the progress of industrial development.

All that being so, one would expect that foreign capital would be positively encouraged to continue to enter India but, instead, recent legislation gives a contrary impression. An amendment to Indian Company Law, at present on its way through Parliament, while not directly affecting our interests, indicates a disturbing trend in economic thought. An Act amending the Constitution does have a direct and adverse bearing on us, at least potentially, because it removes the right which the Constitution formerly gave to anyone whose property was acquired by the State to challenge the adequacy of the compensation in the Courts. The amount of compensation is now to be decided by the Legislature.

In the latter amendment "searching for or winning Mineral Oils" is specified as one of the matters over which the State should be able to take full "control" by means of "the extinguishment or modification of any rights accruing by virtue of any agreement, lease or licence" which Government may have granted for that purpose.

The powers taken are permissive, and we are assured that the present Government of India have no intention of using them to expropriate foreign capital and so damage their international relations and credit in the world. I must state in all fairness that in our past experience they have always been as good as their word but Governments change, and this wide power and the removal of the protection of the Courts are now written into the Constitution. For those like ourselves, who are already established in India, the proof of the pudding must be in the eating.

TANKERS

The Fleet has operated satisfactorily and without accident during the year. Our three new vessels have fully realized expectations and have been able to meet all demands made upon them. On two voyages no less than seven different grades of bulk oil as well as packed cargo were carried.

For the first time since they were built, the Special Surveys of s.s. "Badarpur" and m.v. "Yenangyaung" were carried out in U.K. instead of in India, when the opportunity was taken to increase the capacity of the latter to the size of our new ships. Both vessels returned to the East in March, 1954, and continue to give excellent service.

LABOUR

In the field of industrial relations I am glad to say that there was no serious interruption of the Group's operations in any area.

Our relations with Trades Unions have been satisfactory. Too often, however, the opinion is expressed in Trade Union and other quarters that an Oil Company has an unlimited "capacity to pay". This is far from true and our mounting costs in clerical and labour salaries and wages are a source of some anxiety. Coupled with this is the desire of Governments, understandably in the light of national under-employment, to press for employment of the greatest possible numbers, a policy which can only militate against the ability to pay more in return for a higher over-all output per man.

PERSONNEL

It is once more a pleasure to record the Board's appreciation of the loyal and efficient services throughout the past year of the Group's personnel, both at home and overseas.

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LYNDHURST DEEP-LEVEL (GOLD AND SILVER)

The annual general meeting of Lyndhurst Deep-Level (Gold and Silver) Ltd., was held on May 31 in London.

Mr. Robert Annan, M.I.M.M. (the chairman), in the course of his speech said: Mining operations continued on the same scale as in the previous year, the tonnage treated in the Konongo mill and the revenue from gold showing little change.

Past taxation allowances have all been worked off and Income and Profits Taxes now absorb £57,500 in addition to the £6,152 of Minerals Duty to which I have already referred, as compared with £26,000 last time. Against this a provision previously made of £6,000 for Excess Profits Levy is no longer required. After providing £1,377 for depreciation and bringing in the balance from the previous year there is an available balance of £92,974. Out of this your directors recommend a dividend of 25 per cent. less tax at 8s. 6d. in the pound, costing £63,250, leaving £29,724 to be carried forward.

In the first four months of the current year 4,360 tons of ore have been sent to the Konongo mill, yielding 4,591 ounces of gold and a working profit of £22,691.

Development on the property during the year disclosed nothing of value and the extraction of 11,995 tons of ore assaying 24.0 dwt. reduced the development reserves by 8,845 tons, leaving 22,105 tons assaying 16.9 dwt. of which 4,170 tons is contained in pillars.

Details of the development done are contained in the Consulting Engineers' report which accompanies the accounts. This shows that development north of Boabedroo has been suspended after failing to discover ore in this area. Work on the Zongo Reef and in the Gibson Reef area has also been unproductive.

As I have indicated in the past three years, the remaining possibilities have been progressively eliminated and we must now accept the position that no further ore-bodies of any importance are likely to be found in our property. The exploration of the property has been thorough in the extreme. The entire surface area of the vein system was re-examined in great detail three years ago, the geology has been the subject of several independent reports and every showing has been tested by diamond drilling and underground development at a total cost which exceeds £277,000. Further major expenditure of this nature can no longer be recommended. Extraction of the remaining ore-reserves will continue as at present.

KONONGO'S SUCCESS

We retain our holding of 2,708,411 Konongo shares. That Company has had a successful year, repeating its final dividend of 10 per cent. and interim of 5 per cent. Tonnage milled was 34,325 for a yield of 35,533 ounces and the ore reserve at the end of the year showed a small increase at 221,490 tons averaging 14.4 dwt. per ton.

Konongo, in the course of its operations, has also accumulated substantial reserves and it now proposes to utilize a large part of these in making a cash repayment of capital amounting to 1/- per 2s. share. This proposal now awaits the sanction of the Court before payment can be made.

QUESTION OF AMALGAMATION

As I have said on previous occasions, the future of our Company is very much bound up with that of Konongo. It has been suggested on several occasions in the past that a separate existence for the two Companies is hardly justified. Your Directors agree with this view but up to now have not found means to overcome the difficulties involved, in particular those relating to taxation and to the relative valuation of the properties.

As the two properties have been operated by the same staff on a basis of sharing expenses, the economy to be achieved by amalgamation would not have been great. It now appears that a position is being reached where the difficulties are solving themselves and your Directors are now examining the question afresh in the hope that they may be able to put some proposal to you before the end of the current year. I cannot say more than this at present.

During the past year the West African Gold Corporation decided to reduce its staff and activities in the Gold Coast and our service agreement with them as Consulting Engineers was terminated. I would like to record our gratitude to them for the great help they have given us in the past.

A new arrangement for consulting services has been made with New Consolidated Gold Fields Ltd. by which some economy has been effected. I also desire to record our thanks to the General Manager and his staff for their services in the past year.

The report and accounts were adopted.

KILLINGHALL TIN

A DIVIDEND OF 20 PER CENT

The annual general meeting of Killinghall Tin Limited was held in London on May 26, **Mr. Jack Addinsell,** the Chairman, presiding.

The following is an extract from his circulated statement:—

The results of the financial year show a satisfactory improvement on those of the previous year, the output from the dredge being 595 tons of tin ore compared with 286 tons. After crediting interest and sundry receipts and charging head office expenses, depreciation, etc., the profit before tax amounted to £97,277.

Since the resumption of trading after the war the most conservative basis has been adopted in estimating tax liabilities arising upon the company's profits and War Damage Compensation. A more favourable settlement has been agreed with the Inland Revenue and in consequence the substantial sum of £60,836 has been released from the tax provision. Of this sum, £18,620 has been applied in writing off the balance of the expenditure on Rehabilitation and Reconstruction.

After bringing in the balance from the previous year, and the over-provision of tax, and charging £59,400 for tax on the year's profits, there remains a balance of £101,742. Your directors recommend a dividend of 20 per cent., requiring £17,250 net, and we have transferred to General Reserve £55,000 leaving £29,492 to be carried forward to the current financial year.

The dredge continues to operate in ground of variable tin ore content, but test bores in the remaining area within the present sub-leases indicate the occurrence, in places, of payable values of tin ore below the present maximum digging depth of the dredge and we are now investigating possible methods of recovery, which may entail some modification to the dredge. This factor, together with the General Managers' constantly reiterated warnings that the ore recovery from this mine will always be of a most uneven nature, has made prudent the substantial appropriation to General Reserve.

A further area of the rubber estate is now being prospected and, provided closer boring confirms the values indicated by initial bores, may provide additional employment for the dredge in due course.

For the first six months of the current financial year the output of tin ore, which has varied considerably from month to month, totalled 233 tons and you will note that the General Managers anticipate a satisfactory overall rate of production, although considerable variations in outputs are to be expected.

Stockholders will have read in the Press of the progress towards the ratification of the International Tin Agreement which is being made by the participating countries. It now appears unlikely that any scheme of restriction can come into effect before the second half of 1955, and it is not possible at this stage for me to forecast what effect the implementation of the scheme might have on this company's operations.

In conclusion, I am sure stockholders will again wish me to thank the staff at the mine and our General Managers, Messrs. Osborne and Chappel, for their year's work under conditions which, while improving slowly, remain difficult and often dangerous.

The report was adopted.

I.M.M. AWARDS, 1955

The Council of the Institution of Mining and Metallurgy announces that the Gold Medal of the Institution has been awarded to Emeritus Professor William Richard Jones, past president of the Institution, in recognition of his services to the science of economic geology and to the Institution. Honorary Membership of the Institution has been conferred on Mr. George Alfred Denny in recognition of his distinguished services to the mining industry of the Union of South Africa, notably in the early development of Witwatersrand gold mines, and was received by Mr. C. M. Moerdyk, South African Mines Department Representative in the U.K.; and on Dr. Joseph Burr Tyrrell in recognition of his work in the exploration and development of the mineral resources of Canada, which was received by Mr. Bowers, the Canadian Government Trade Councillor in London. The Consolidated Gold Fields of South Africa Limited Premium of Forty Guineas for 1954 has been awarded to Mr. Gerald Chad Norris for his paper entitled, "Some grinding tests with spheres and other shapes" (*Transactions Instn. Min. Metall.*, Vol. 63). The "Arthur Claudet" Students' Prize for 1954 has been awarded to Dr. Anthony René Barringer for his paper entitled, "The preparation of polished sections of ores and mill products using diamond abrasives, and their quantitative study by point counting methods" (*Transactions Instn. Min. Metall.*, Vol. 63).

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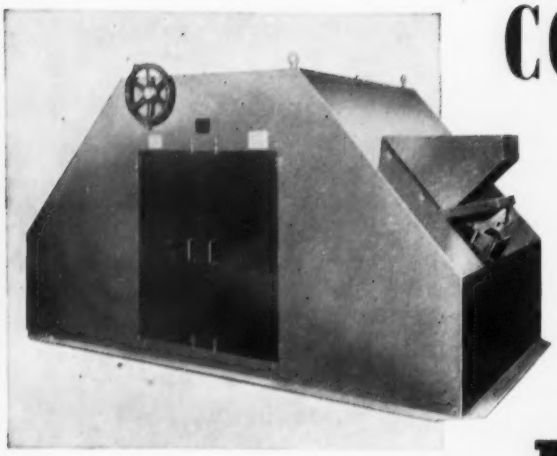

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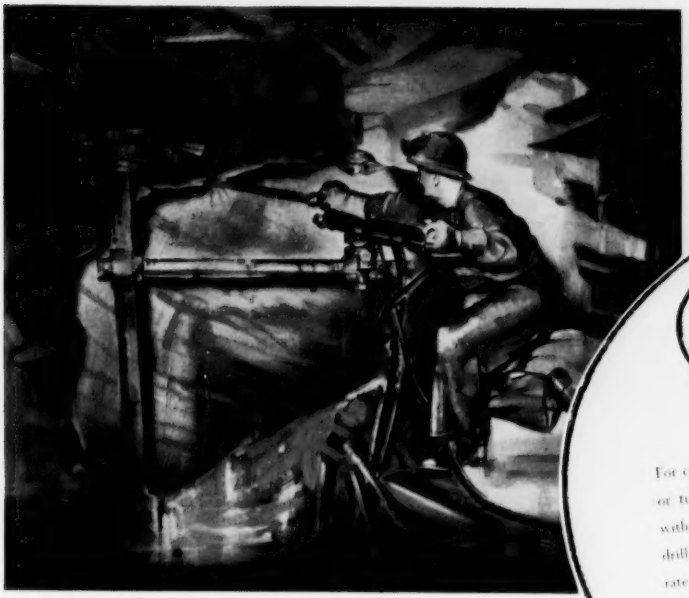

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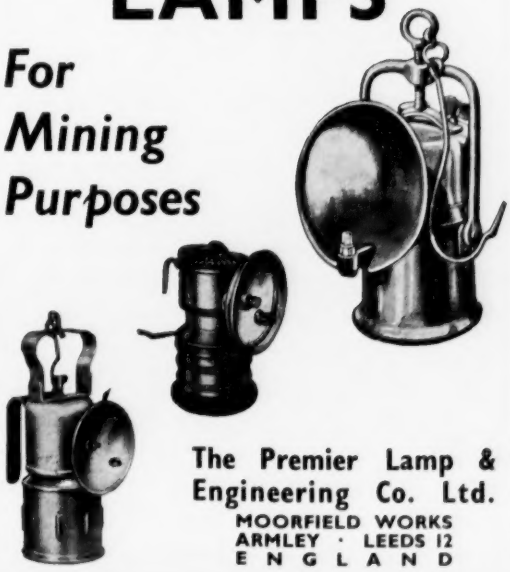

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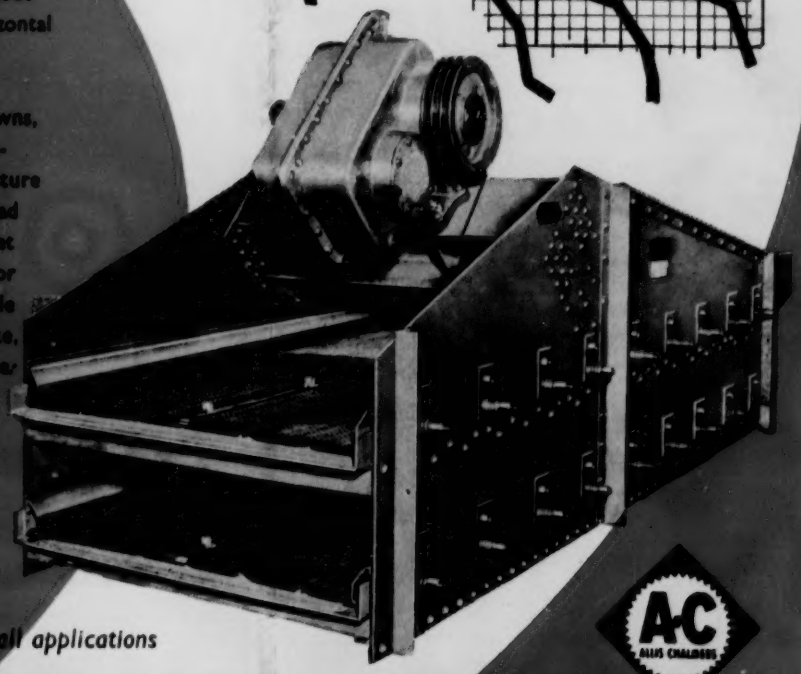

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